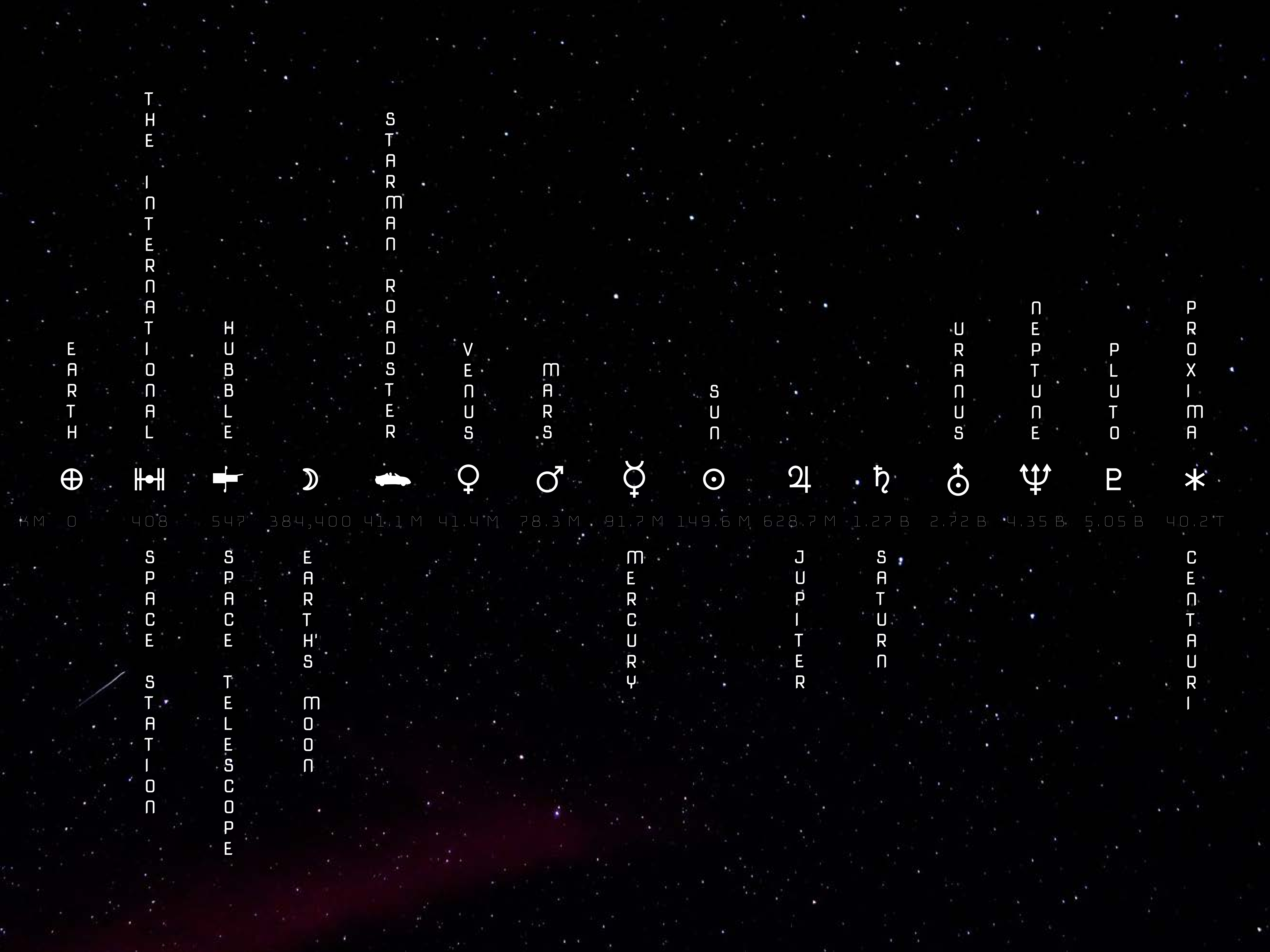
BEY ND

AN OUTWARD VOYAGE THROUGH * SPACE



		KM
EARTH	⊕	0
THE INTERNATIONAL SPACE STATION	🛰	408
HUBBLE SPACE TELESCOPE	🛰	547
EARTH'S MOON	☽	384,400
STARMAN ROADSTER	🚗	41.1 M
VENUS	♀	41.4 M
MARS	♂	78.3 M
MERCURY	☿	91.7 M
SUN	☉	149.6 M
JUPITER	♃	628.7 M
SATURN	♄	1.27 B
URANUS	⛢	2.72 B
NEPTUNE	♆	4.35 B
PLUTO	♇	5.05 B
PROXIMA CENTAURI	⁎	40.2 T

⊕ **0 KM**

EARTH

BEYOND is an exploratory journey outward from Earth. Revisiting Ptolemy's geocentric view of the universe, our extraterrestrial neighbours are visited in order, starting with man-made satellites and progressing 40 trillion kilometres to Proxima Centauri.

As the space age continues to gain traction, this publication seeks to present a snapshot of a transient moment in history, when the exclusivity of space has been lifted, with NASA and SpaceX images available to the masses, and before private space travel becomes a commercial industry for the elite.

The distance from Earth to the objects herein is ever-changing, as they and we follow our orbital paths. The distances on the contents are averages, save for Starman Roadster, whose elliptical path varies greatly – as such, its distance at closest approach was selected.

408 KM
THE INTERNATIONAL SPACE STATION

i

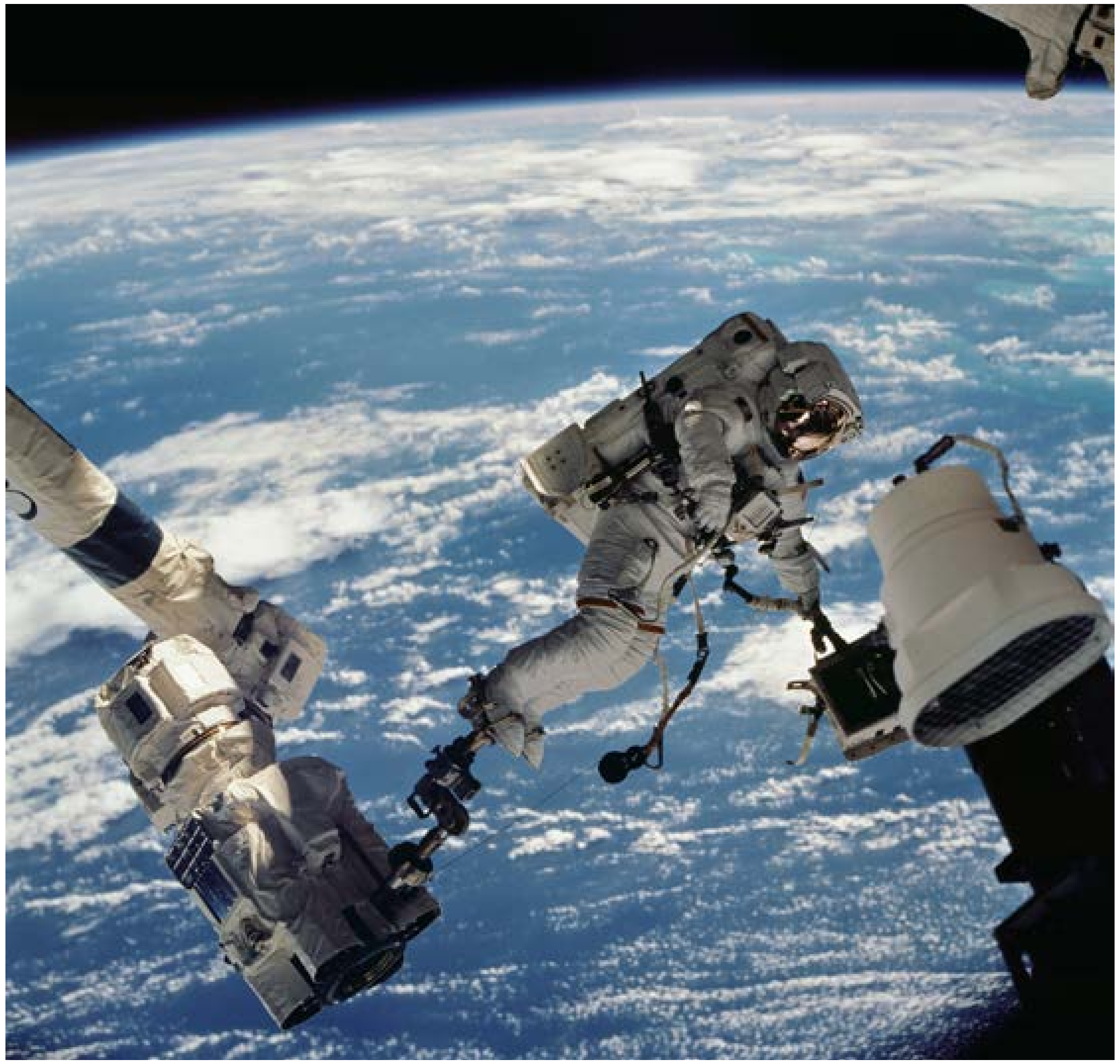
ISS TIMELINE

1984 DESIGN BEGINS
1986 CHALLENGER DISASTER
1998 ASSEMBLY BEGINS
2000 FIRST CREW
2001 US LAB ADDED
2003 COLUMBIA DISASTER
2007 UTILITY HUB ADDED
2008 EUROPEAN & JAPANESE LABS ADDED

DESIGN BEGINS

Design began following President Ronald Reagan's State of the Union Address on 25 January 1984, directing NASA to build an international space station within the next 10 years.

Mark Vande Hei took this photo from aboard the ISS: "Hello Little Rock, Memphis, Jackson, New Orleans, Birmingham, Miami, and many places in between!"



VISITORS BY COUNTRY

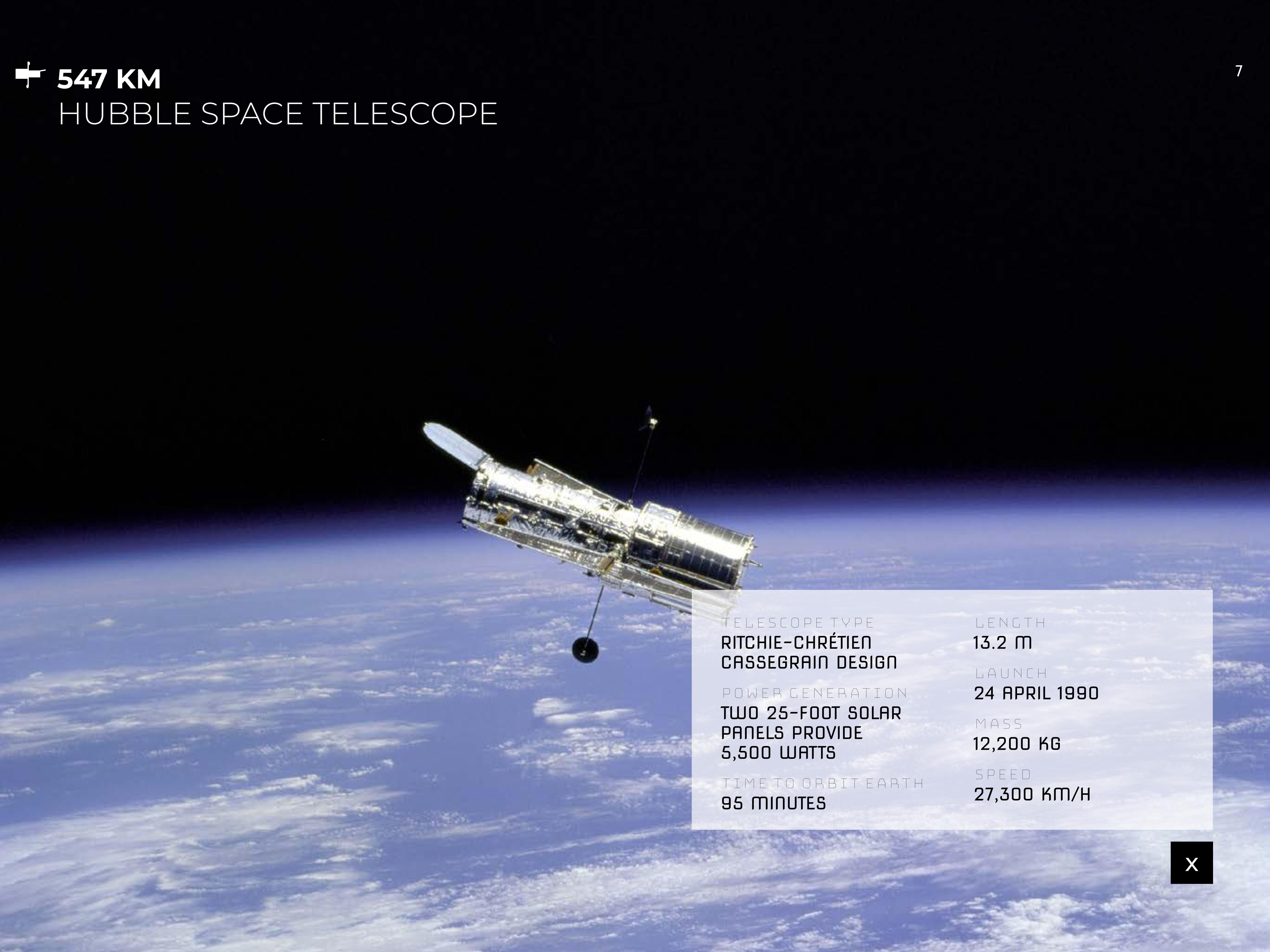
United States – 152 people
Russia – 49 people
Japan – 9 people
Canada – 8 people
Italy – 5 people
France – 4 people
Germany – 3 people
Belgium – 1 person
Netherlands – 1 person
Sweden – 1 person
Brazil – 1 person
Denmark – 1 person
Kazakhstan – 1 person
Spain – 1 person
United Kingdom – 1 person
Malaysia – 1 person
South Africa – 1 person
South Korea – 1 person
United Arab Emirates – 1 person

ASTRONAUTS OF THE ISS

The Space Station has been continuously occupied since November 2000. An international crew of six people live and work on the ISS while traveling at a speed of 7.66 kilometres per second. To mitigate the loss of muscle and bone mass in the human body in microgravity, the astronauts work out at least two hours a day. As of November 2020, 242 individuals from 19 countries have visited the ISS.

547 KM

HUBBLE SPACE TELESCOPE



TELESCOPE TYPE
RITCHIE-CHRÉTIEN CASSEGRAIN DESIGN

POWER GENERATION
TWO 25-FOOT SOLAR PANELS PROVIDE 5,500 WATTS

TIME TO ORBIT EARTH
95 MINUTES

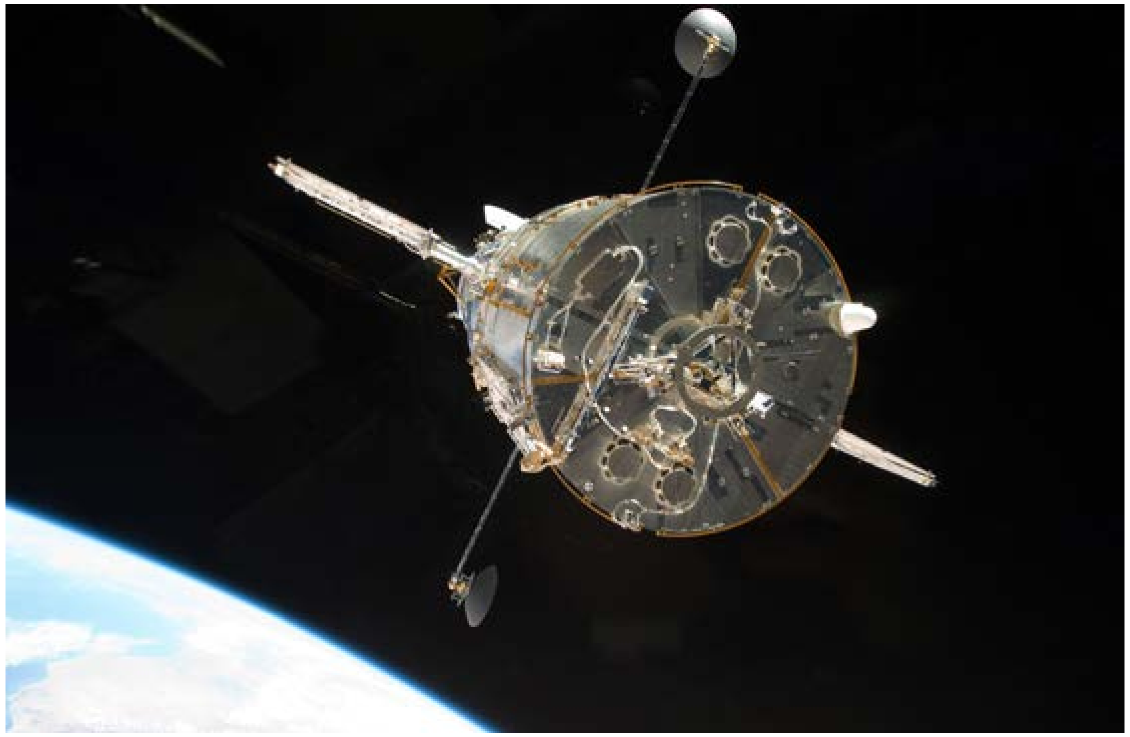
LENGTH
13.2 M

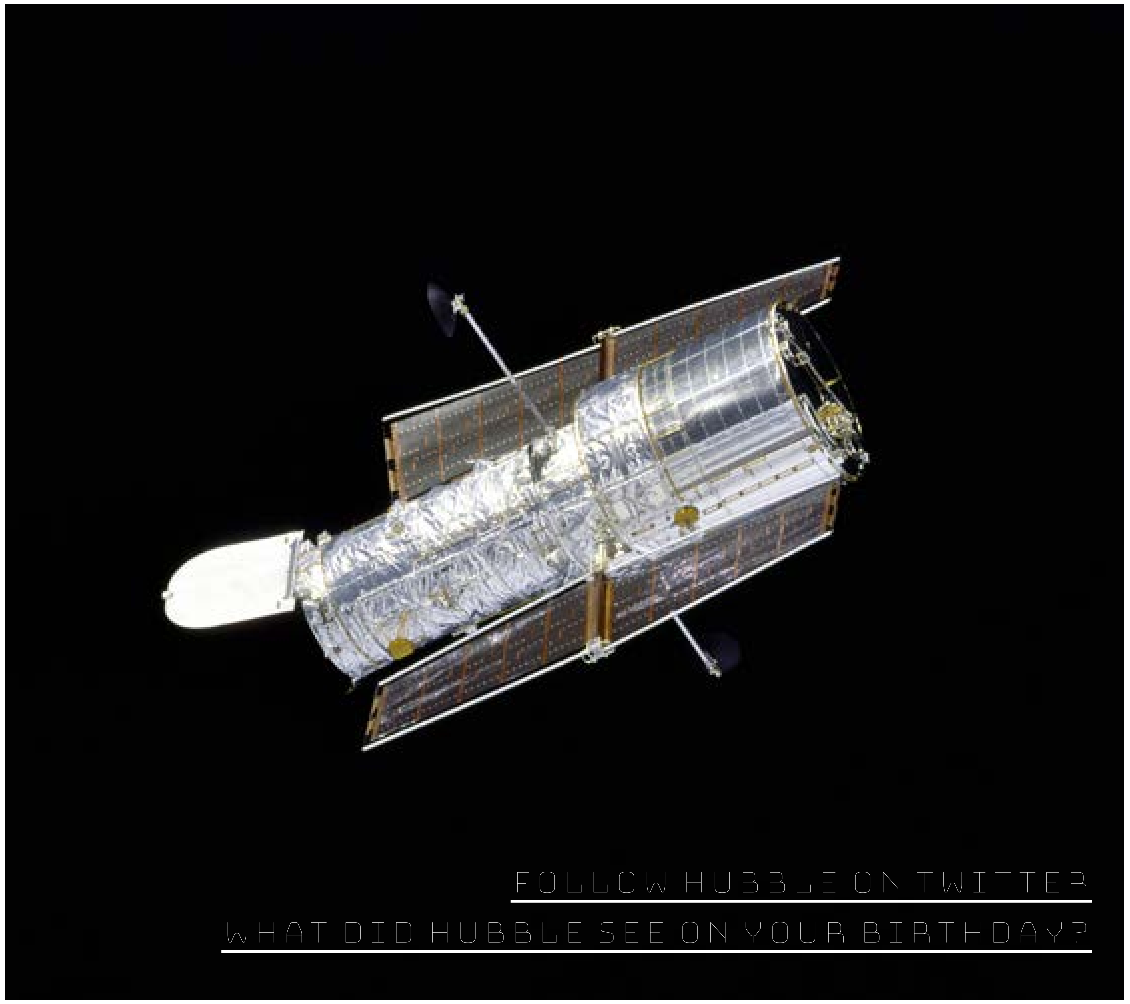
LAUNCH
24 APRIL 1990

MASS
12,200 KG

SPEED
27,300 KM/H

X





FOLLOW HUBBLE ON TWITTER

WHAT DID HUBBLE SEE ON YOUR BIRTHDAY?

HUBBLE TIMELINE

24 April 1990	LAUNCH
25 April 1990	DEPLOYMENT
20 May 1990	FIRST IMAGE

LAUNCH

Space Shuttle Discovery (on mission STS-31) launched from the Kennedy Space Center in Florida on 24 April 1990, carrying five astronauts and the Hubble Space Telescope.

DISCOVERIES

- DARK MATTER
- PLUTO AND ITS MOONS
- PROTOPLANETARY DISKS
- GAMMA RAY BURSTS
- COMET SHOEMAKER-LEVY 9
- DARK ENERGY
- BLACK HOLES
- ALIEN WORLDS
- AGE OF THE UNIVERSE

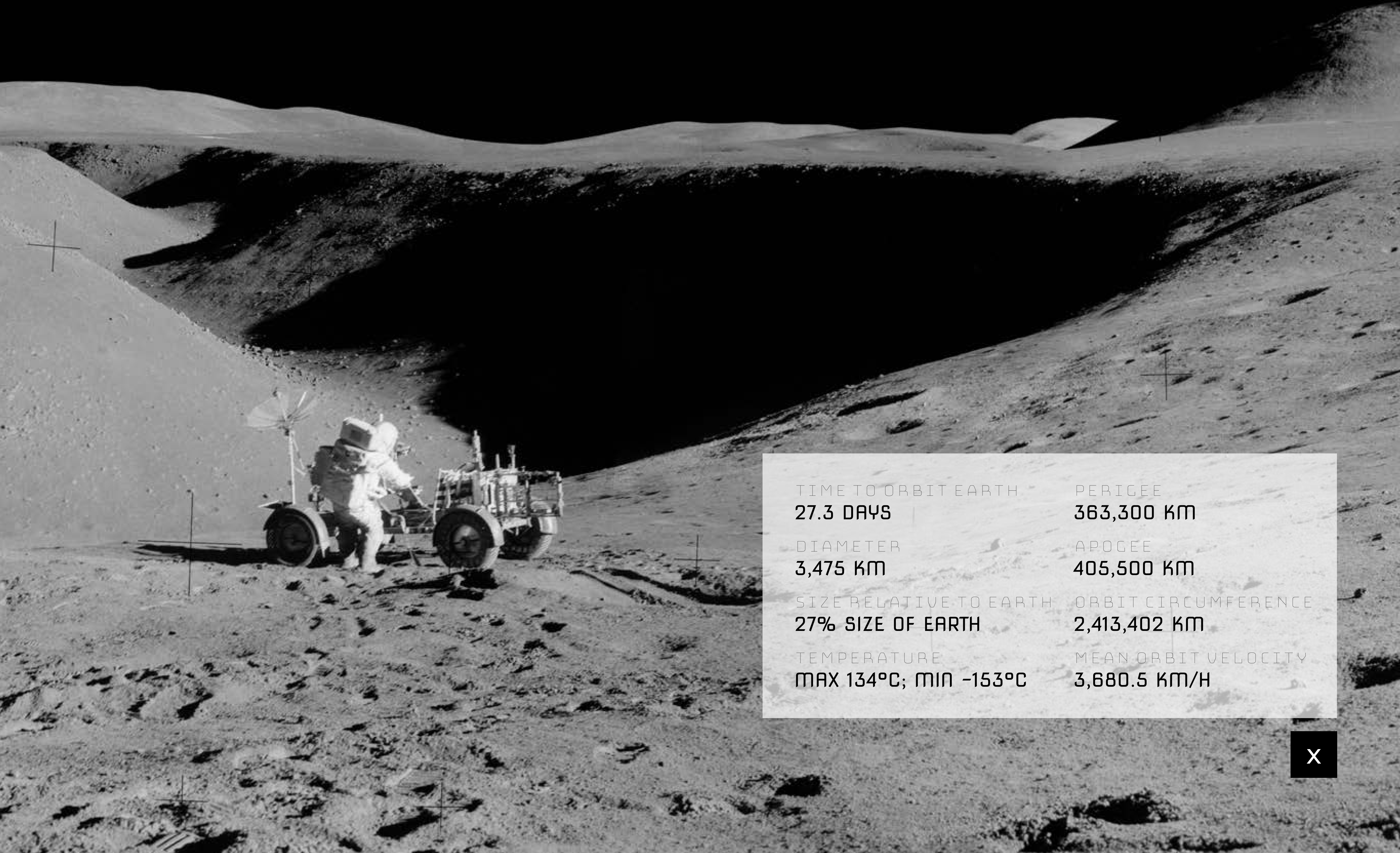
PROTOPLANETARY DISKS

By gazing at star-forming regions such as the Orion Nebula, Hubble was able to show that protoplanetary disks of gas and dust are ubiquitous around many young stars. This reinforces the idea that alien worlds are common in the universe.

The Hubble Ultra-Deep Field is an image of a small region of space in the constellation Fornax, containing an estimated 10,000 galaxies. The original release was combined from Hubble Space Telescope data accumulated over a period from 24 September 2003 through to 16 January 2004.

☽ 384,400 KM

EARTH'S MOON



TIME TO ORBIT EARTH
27.3 DAYS

DIAMETER
3,475 KM

SIZE RELATIVE TO EARTH
27% SIZE OF EARTH

TEMPERATURE
MAX 134°C; MIN -153°C

PERIGEE
363,300 KM

APOGEE
405,500 KM

ORBIT CIRCUMFERENCE
2,413,402 KM

MEAN ORBIT VELOCITY
3,680.5 KM/H

X

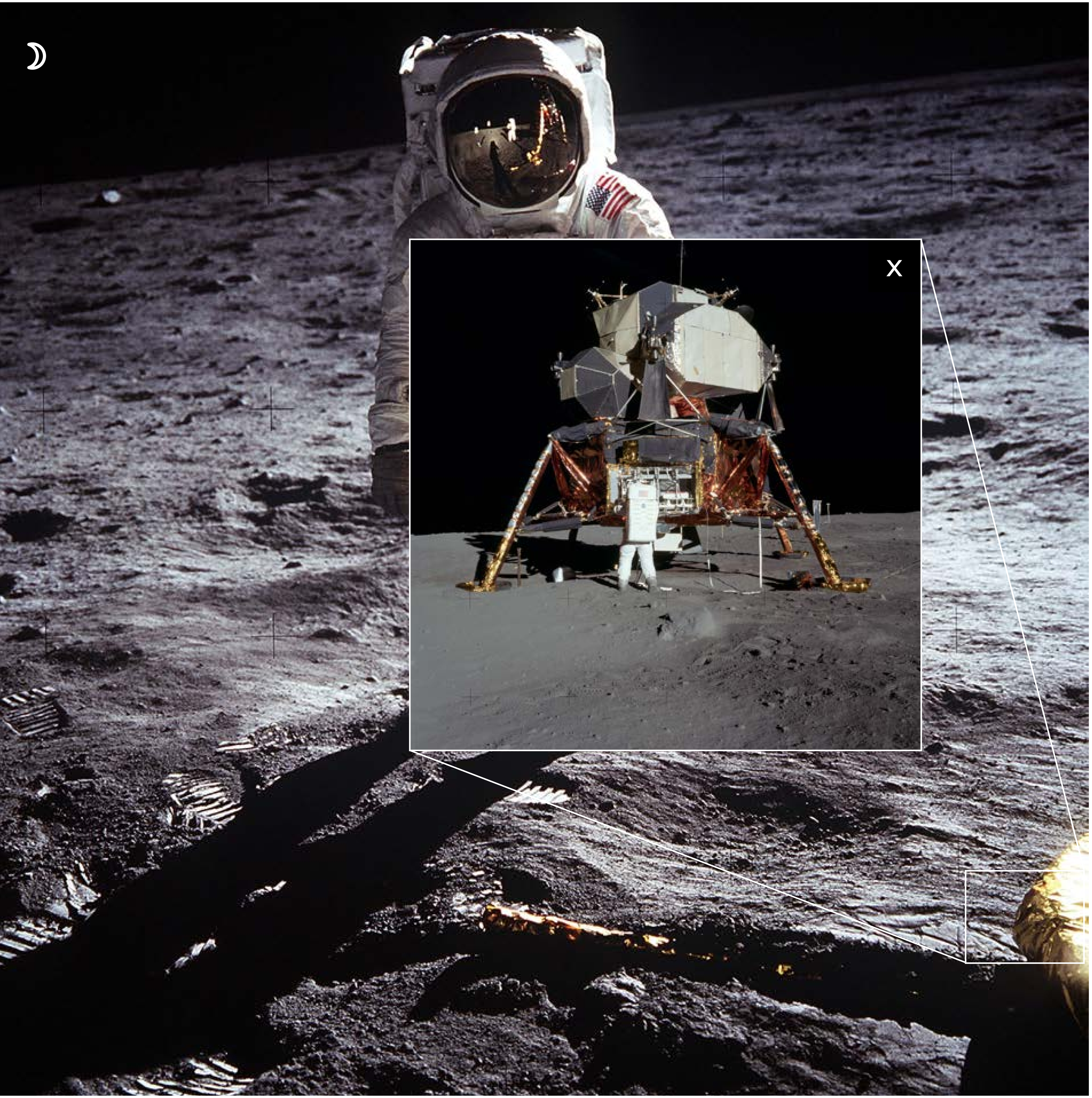
EXPLORE THE APOLLO 11 LANDING

Apollo 11 was the spaceflight that first landed humans on the Moon. Commander Neil Armstrong and lunar module pilot Buzz Aldrin formed the American crew that landed the Apollo Lunar Module Eagle on 20 July 1969, at 20:17 UTC.

MOON SURFACE

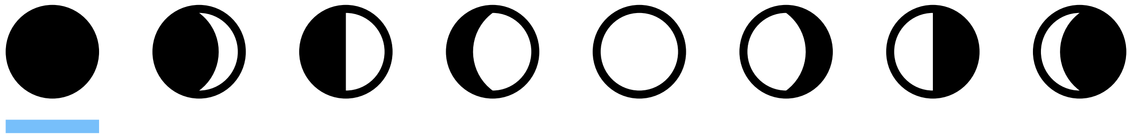
FOOTPRINTS

EAGLE LANDER



Lunar Module Eagle (LM-5) is the spacecraft that served as the crewed lunar lander of Apollo 11, which was the first mission to land humans on the Moon in 1969.

LUNAR PHASES



NEW MOON

ILLUMINATED PORTION

Disc completely in Sun's shadow (lit by earthshine only)

VISIBILITY

Invisible (too close to Sun)

41.1–377.9 MILLION KM
STARMAN ROADSTER

TIME TO ORBIT SUN
557 DAYS

CARRIER
FALCON HEAVY FH-001

LAUNCH SITE
KENNEDY LC-39A

MISSION TYPE
TEST FLIGHT

LAUNCH
6 FEBRUARY 2018

LAUNCH MASS
1,300 KG (6,000 KG INCLUDING ROCKET UPPER STAGE)

SPEED
120,491 KM/H

X

TRAJECTORY

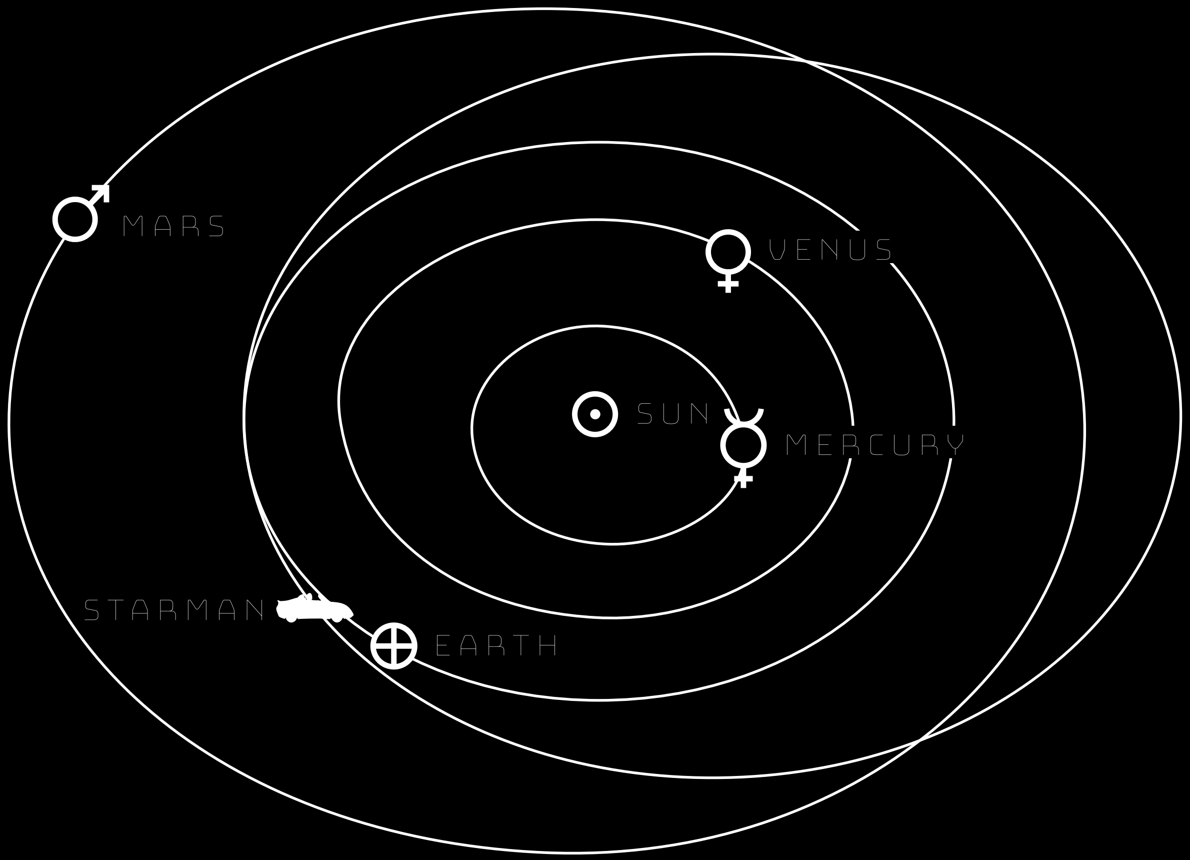
POSITION AT 31 MARCH 2021

SPEED:

32.3 KM/S

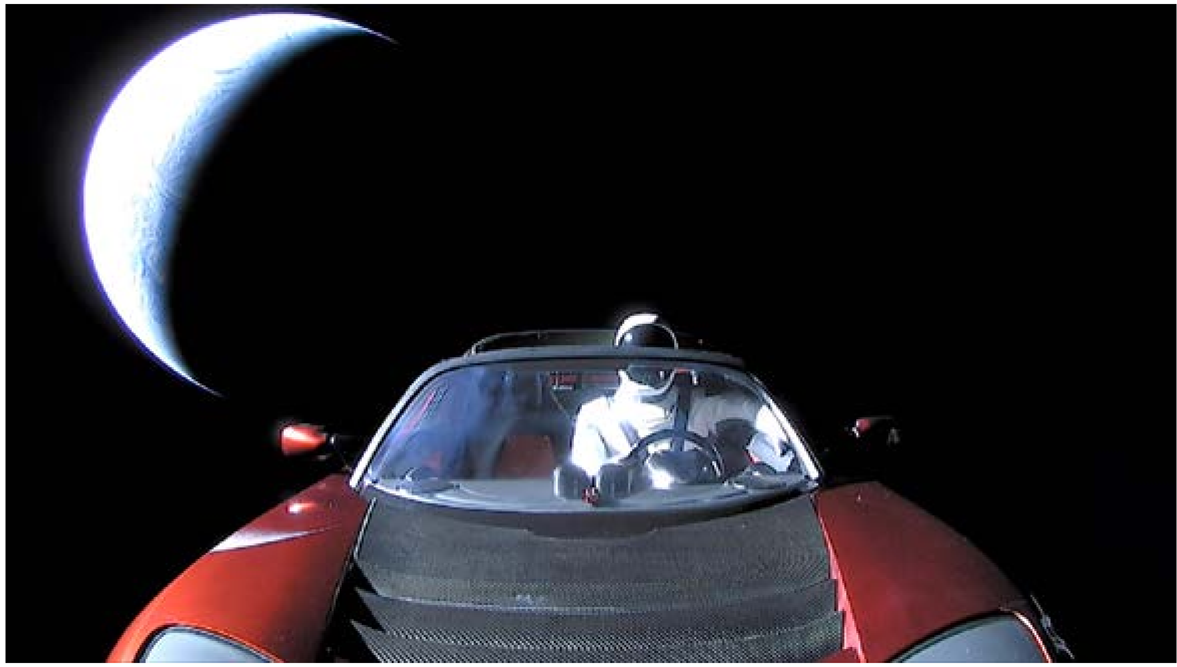
DISTANCE FROM EARTH:

41,099,719 KM



WHERE IS ROADSTER?

WATCH STARMAN CRUISE PAST EARTH



EXPLORE THE ROADSTER

ROADSTER

STARMAN

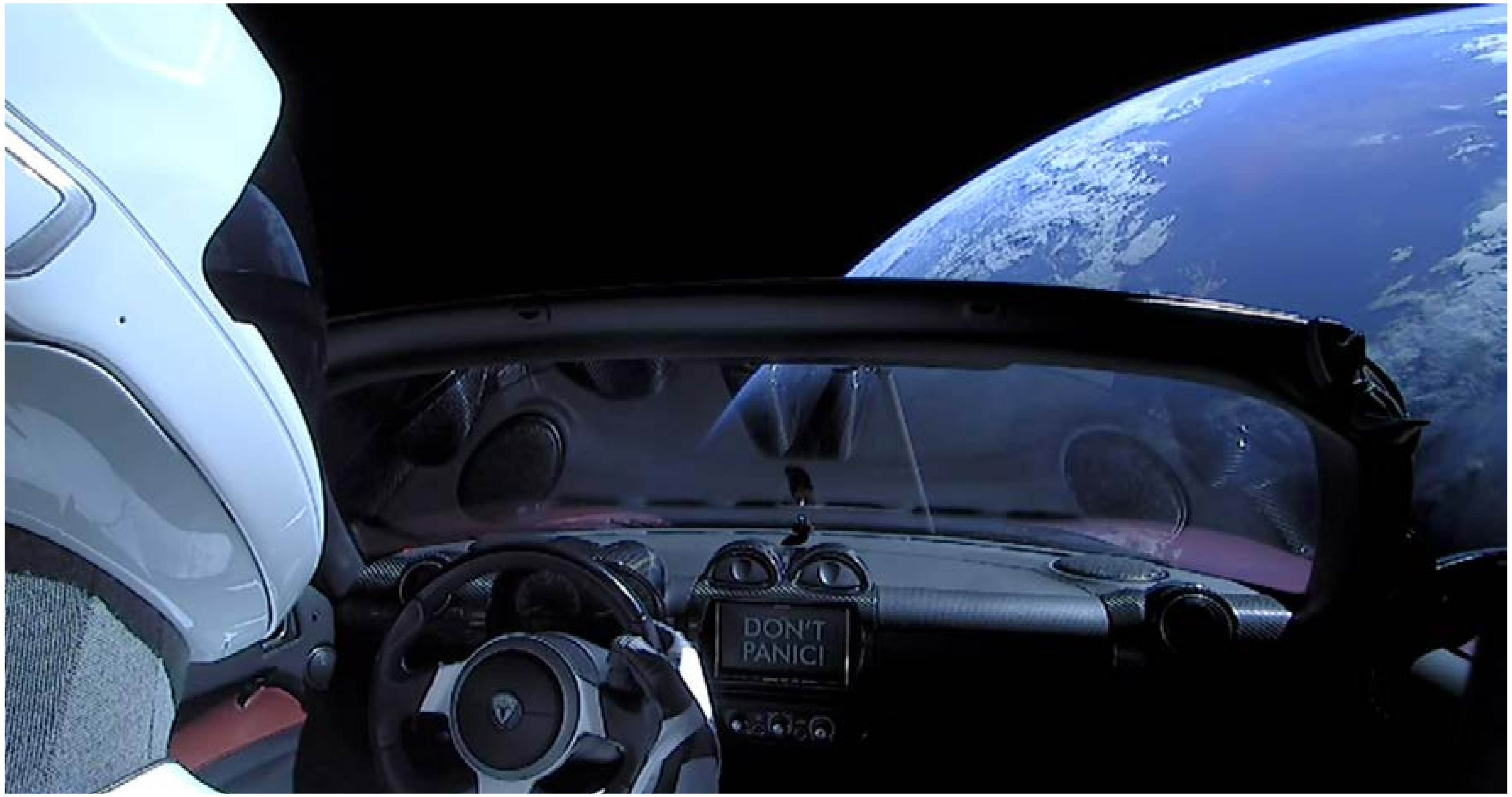
THE HITCHHIKER'S GUIDE

MINI ROADSTER

MADE ON EARTH

FOUNDATION TRILOGY

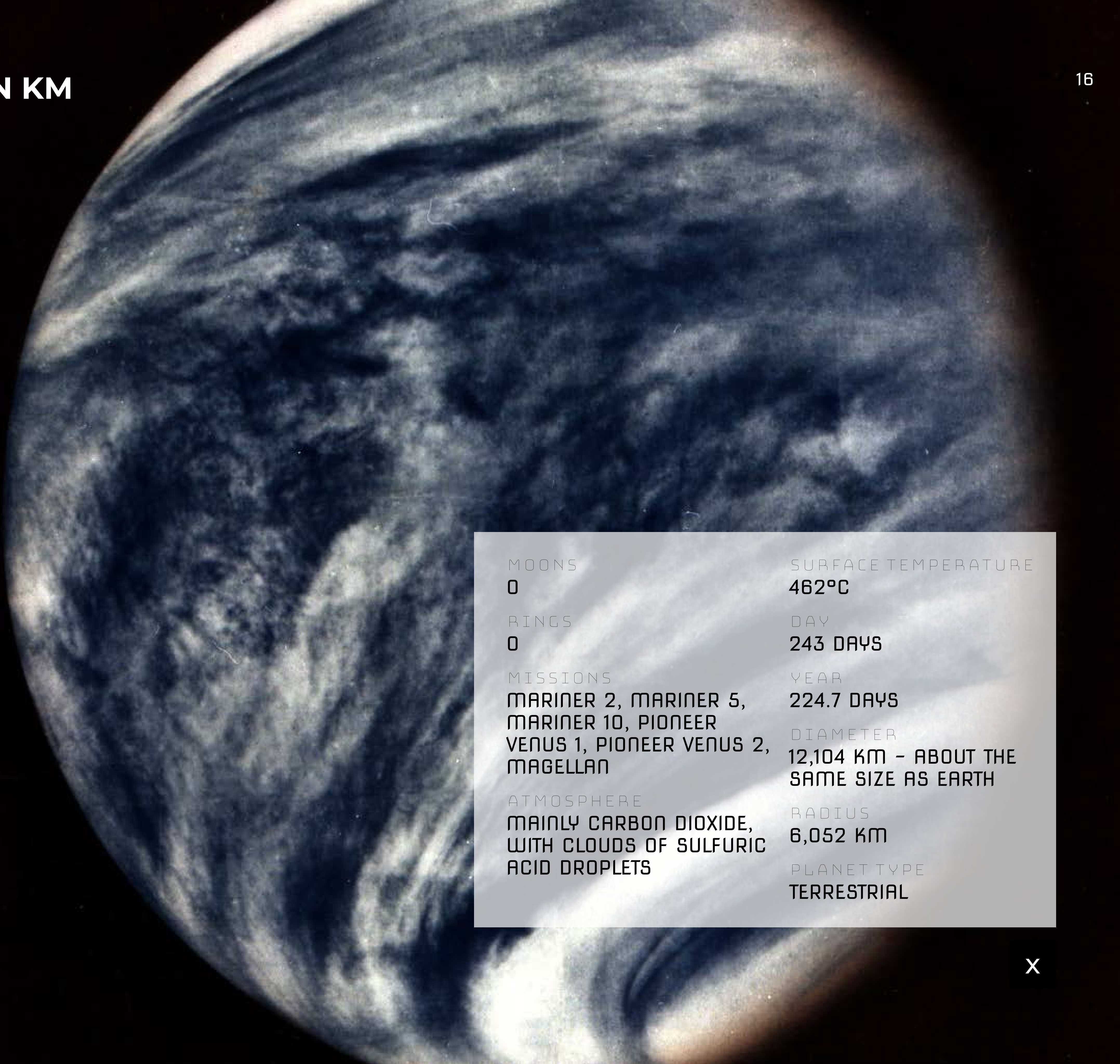
CONTRIBUTORS



THE HITCHHIKER'S GUIDE

There is a copy of Douglas Adams' novel 'The Hitchhiker's Guide to the Galaxy' in the glovebox, along with references to the book in the form of a towel and a sign on the dashboard that reads 'DON'T PANIC!'

♀ 38–261 MILLION KM
VENUS



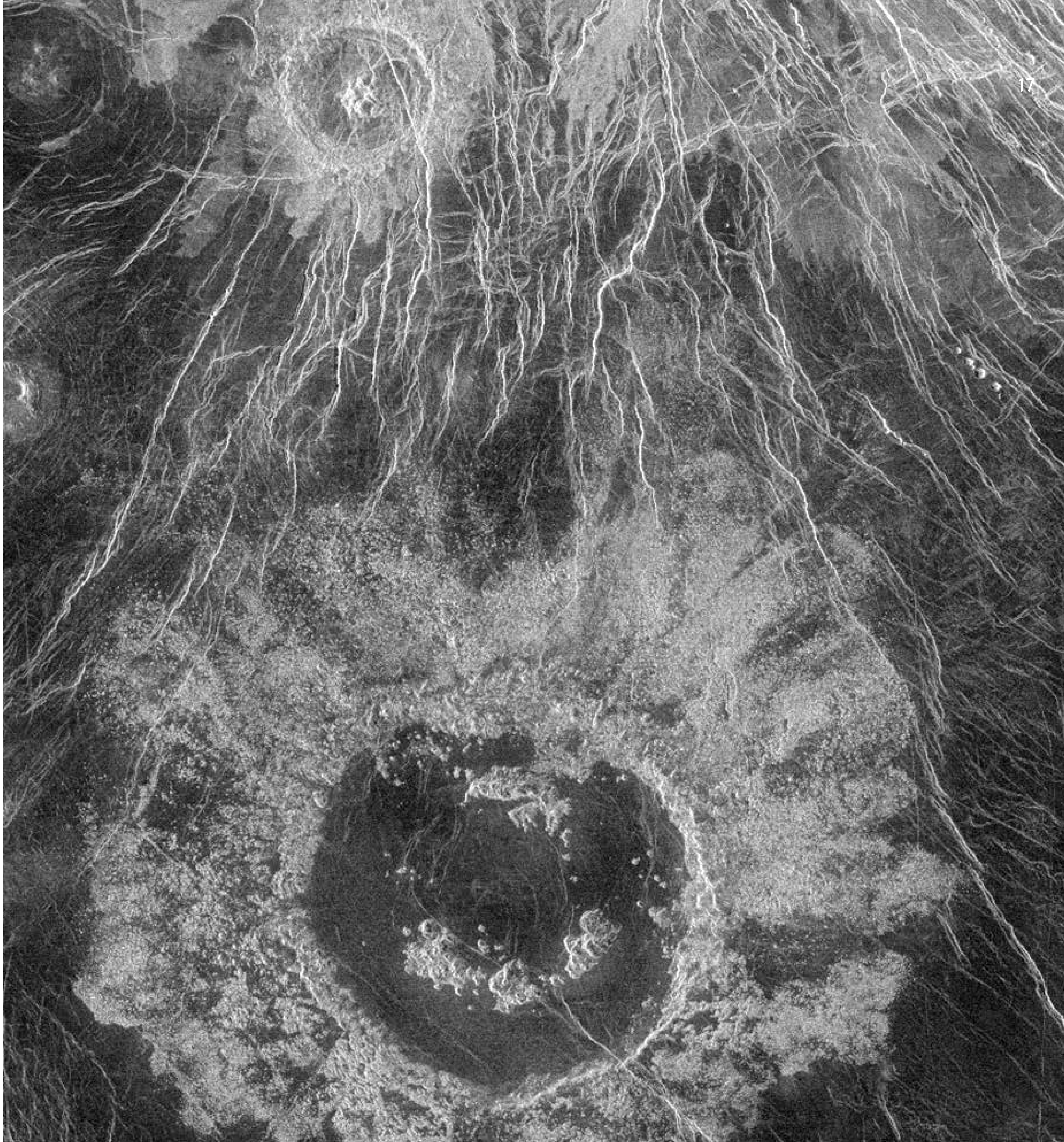
MOONS	0
RINGS	0
MISSIONS	MARINER 2, MARINER 5, MARINER 10, PIONEER VENUS 1, PIONEER VENUS 2, MAGELLAN
ATMOSPHERE	MAINLY CARBON DIOXIDE, WITH CLOUDS OF SULFURIC ACID DROPLETS
SURFACE TEMPERATURE	462°C
DAY	243 DAYS
YEAR	224.7 DAYS
DIAMETER	12,104 KM – ABOUT THE SAME SIZE AS EARTH
RADIUS	6,052 KM
PLANET TYPE	TERRESTRIAL

♀ EXPLORE THE SURFACE

- WHEATLEY CRATER
- LAVA FLOWS
- DICKINSON CRATER
- ISABELLA CRATER
- MARGARET MEAD CRATER
- VENERA 10 LANDING SITE

WHEATLEY CRATER

A Magellan radar image of Wheatley crater on Venus. This 72 km diameter crater shows a radar bright ejecta pattern and a generally flat floor with some rough raised areas and faulting. The crater is located in Asteria Regio at 16.6N,267E.



MAGELLAN

NASA's Magellan mission to Venus was one of the most successful deep space missions. It was the first spacecraft to image the entire surface of Venus, using synthetic-aperture radar and measuring the planetary gravitational field, and made several discoveries about the planet.

4 May 1989	LAUNCH
5 May 1989	DEPLOYMENT
10 August 1990	ARRIVAL
15 September 1990	FIRST IMAGES
13 October 1994	CONTACT LOST

LAUNCH

Magellan, a 1,035 kilogram space probe, was launched from Kennedy Space Center, Complex 39B, aboard Atlantis on 4 May 1989.

♂ 54.6–400.2 MILLION KM
MARS

MOONS	2
RINGS	0
MISSIONS	SEVERAL – THE FIRST WAS THE MARINER 4 FLYBY IN 1965
ATMOSPHERE	MOSTLY CARBON DIOXIDE, ARGON, NITROGEN, AND A SMALL AMOUNT OF OXYGEN AND WATER VAPOR
SURFACE TEMPERATURE	-87°C TO -5°C
DAY	24 H, 37 M, 22.7 S
YEAR	686.98 DAYS
DIAMETER	6,779 KM – ABOUT HALF THE SIZE OF EARTH
RADIUS	3,390 KM
PLANET TYPE	TERRESTRIAL

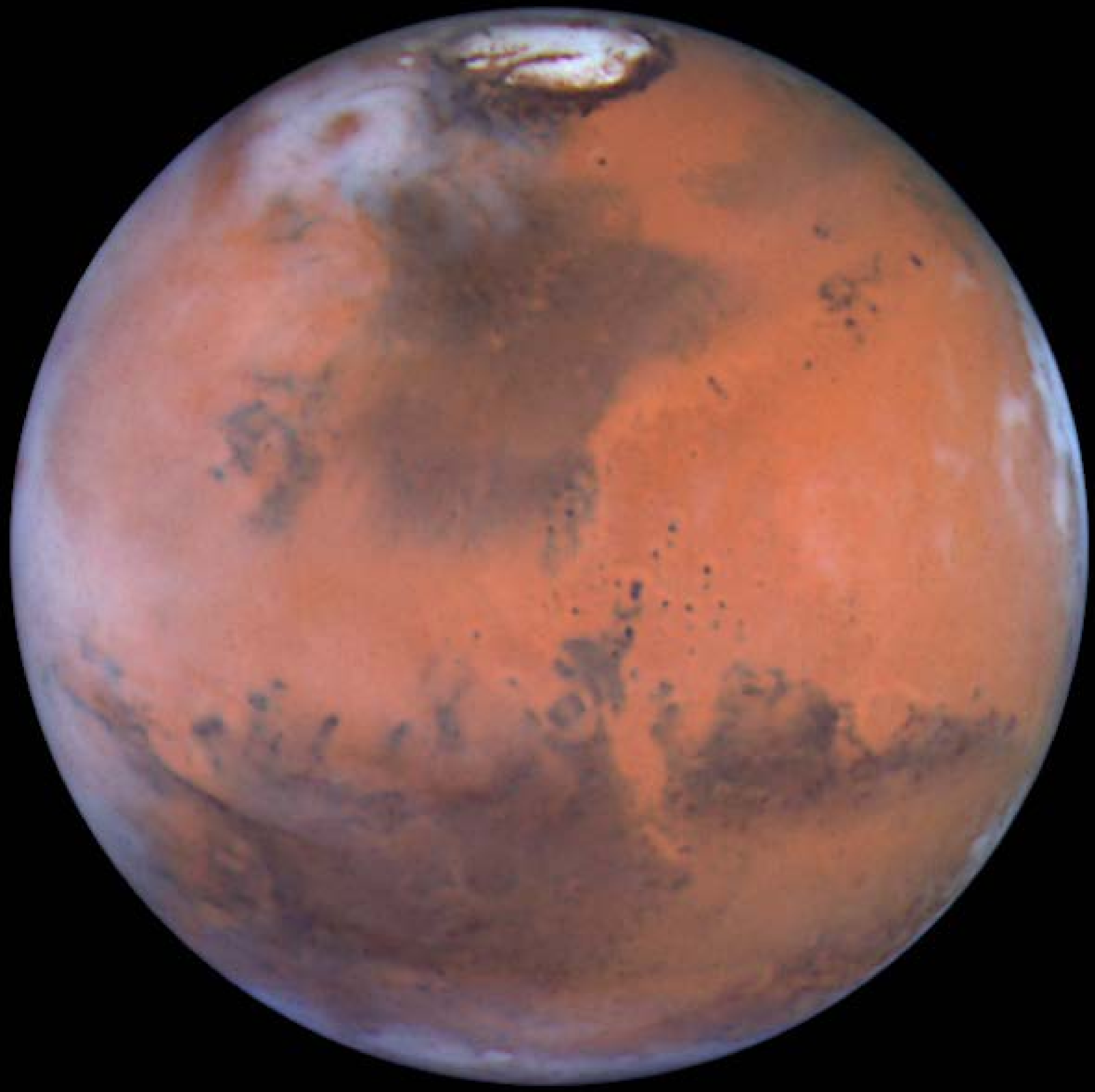
X

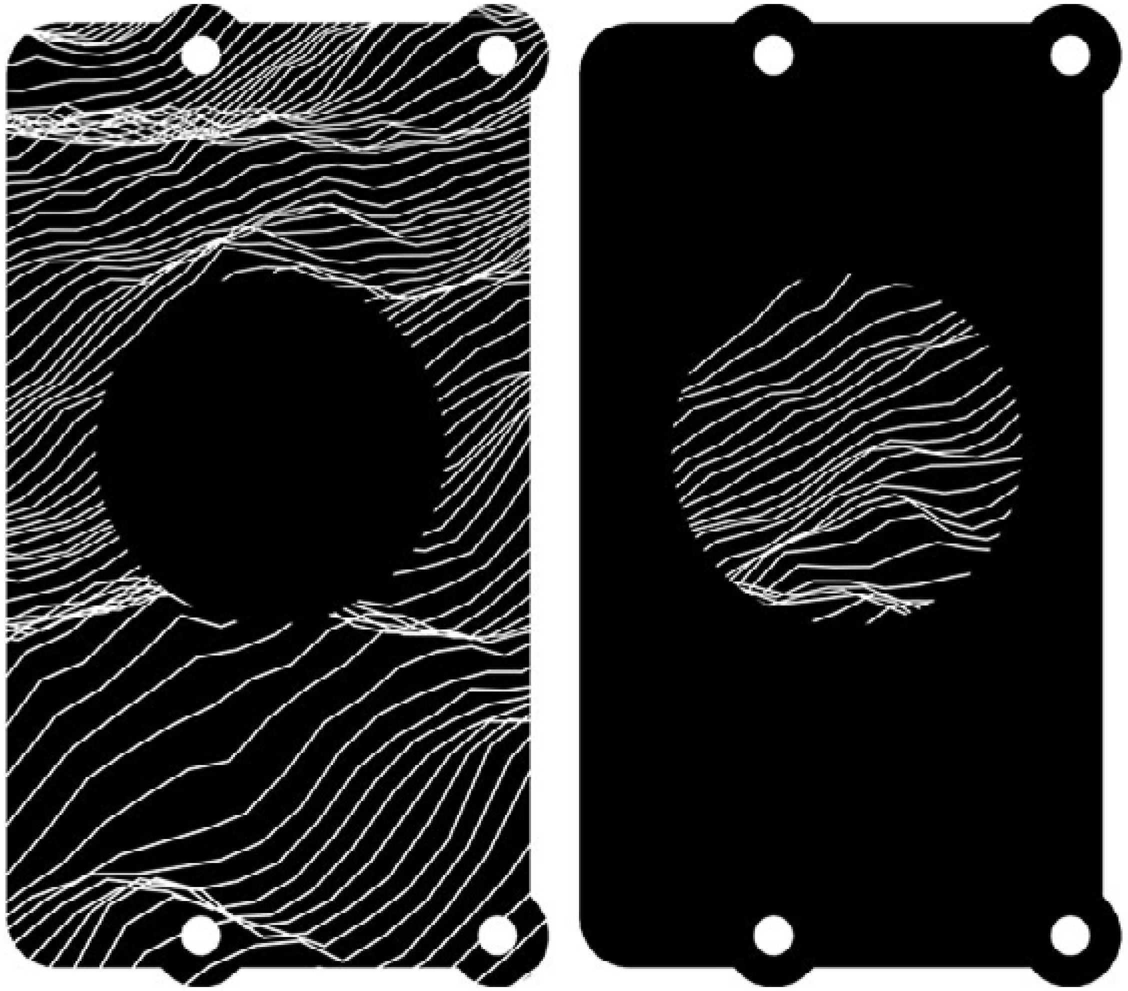
♂ EXPLORE THE FOUR QUARTERS OF MARS

Explore the red planet through pictures captured by Hubble in 1999, at Mars' closest approach to earth in eight years. Each view depicts the planet as it completes one quarter of its daily rotation. Together, these four images show the entire planet.

ACIDALIA

Dark sand dunes surrounding the polar cap merge into a large, dark region called Acidalia, which is composed of sand-sized grains of pulverised volcanic rock. Below and left of Acidalia are the massive Martian canyon systems of Valles Marineris, some of which form long linear markings. Early morning clouds can be seen along the left limb of the planet, and a large cyclonic storm composed of water ice is churning near the polar cap.





BRINGING BACK A PIECE OF MARS ART

This illustration depicts artwork that is etched on two anodised aluminium plates that form a pair. The plates represent the effort to 'bring back a piece of Mars,' via the Mars Sample Return effort. The Mars Perseverance rover will collect and cache Mars samples in Jezero Crater, as the first leg of a multi-mission effort. A future mission would land at Jezero and retrieve the samples for return to Earth. The plate on the left was attached to Perseverance and sent to Mars, while the plate on the right remains on Earth at the Jet Propulsion Laboratory. The delicate lines etched on the plates represent a digital elevation model, created from orbital data of Jezero Crater.

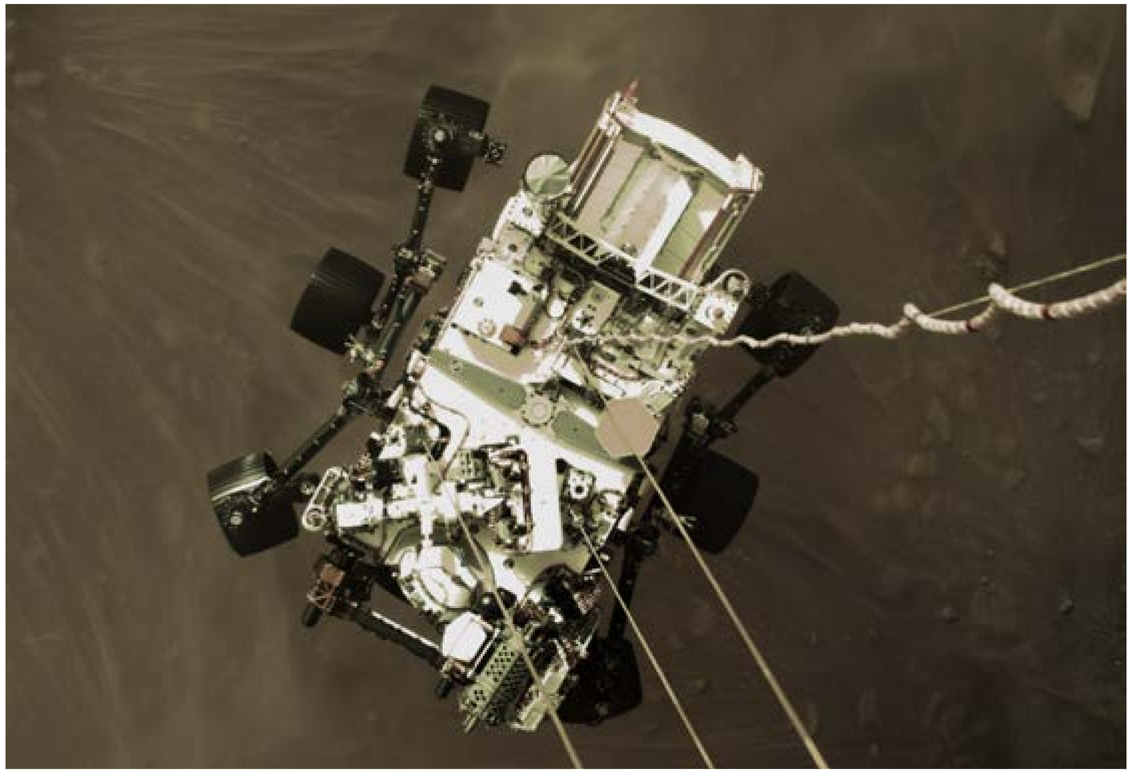
PERSEVERANCE ROVER LANDING

NASA's next-generation Perseverance rover – the largest, most advanced rover NASA has sent to another world – touched down on Mars on 18 February 2021, after a 203-day journey traversing 472 million kilometres. Confirmation of the successful touchdown was announced in mission control at NASA's Jet Propulsion Laboratory at 15:55 EST.

DECODER RING PARACHUTE

ROVER EVOLUTION PLATE ARTWORK

BRINGING BACK A PIECE OF MARS ART



EXPLORE MARS WITH PERSEVERANCE

WATCH PERSEVERANCE LANDING

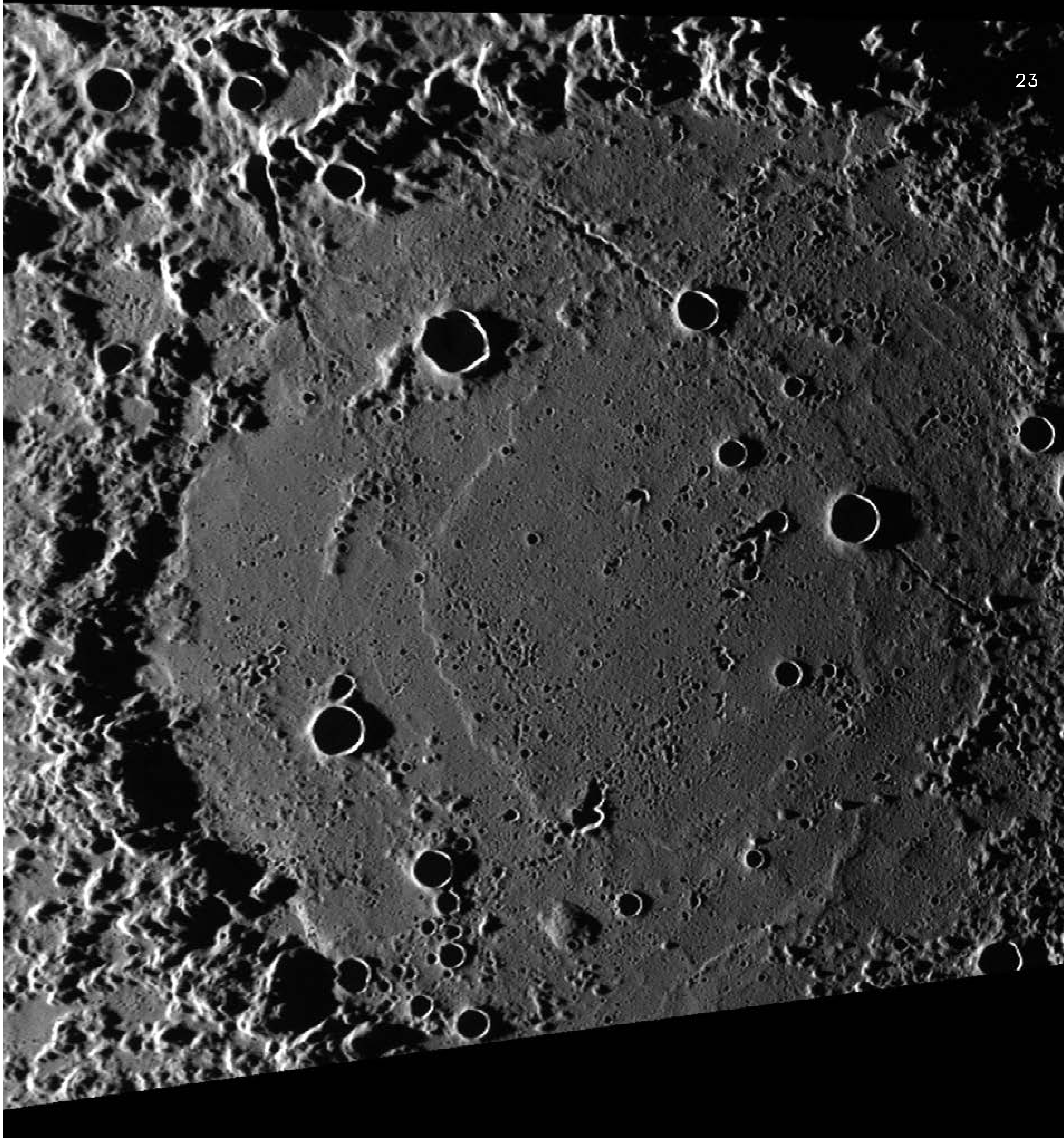
☿ 77–222 MILLION KM
MERCURY

MOONS	0
RINGS	0
MISSIONS	MARINER 10, MESSENGER, BEPICOLOMBO (ON ROUTE)
ATMOSPHERE	NO ATMOSPHERE BUT A THIN EXOSPHERE MADE UP MOSTLY OF OXYGEN, SODIUM, HYDROGEN, HELIUM AND POTASSIUM
SURFACE TEMPERATURE	-173 TO 427°C
DAY	176 DAYS
YEAR	87.97 DAYS
DIAMETER	4,879 KM - JUST OVER 1/3 THE WIDTH OF EARTH
RADIUS	2,439.7 KM
PLANET TYPE	TERRESTRIAL

X

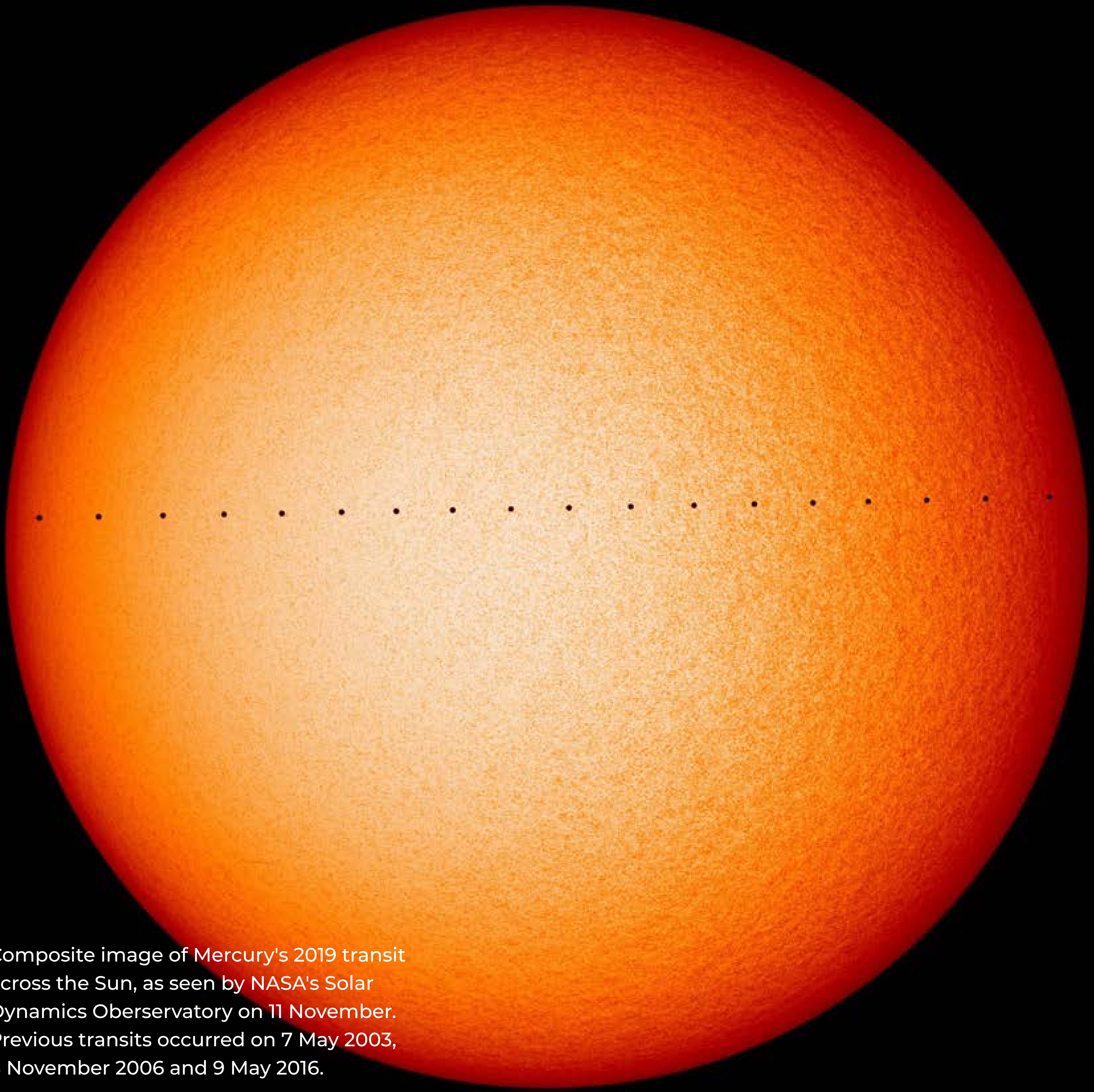
☿ EXPLORE THE SURFACE

- MENA CRATER
- ODIN PLANITIA
- VAN EYCK CRATER
- APOLLODORUS CRATER
- ABEDIN CRATER



VAN EYCK CRATER

The low Sun elevation in this scene emphasizes the topography of Van Eyck crater. The rim of Van Eyck has been profoundly cratered by material ejected from the Caloris Basin. Smooth plains fill the floor of Van Eyck, but they too have been affected by cratering, from large primary impacts to deep, linear incisions by secondary crater chains.



Composite image of Mercury's 2019 transit across the Sun, as seen by NASA's Solar Dynamics Oberservatory on 11 November. Previous transits occurred on 7 May 2003, 8 November 2006 and 9 May 2016.

WATCH THE 2019 TRANSIT

EXPLORING MERCURY

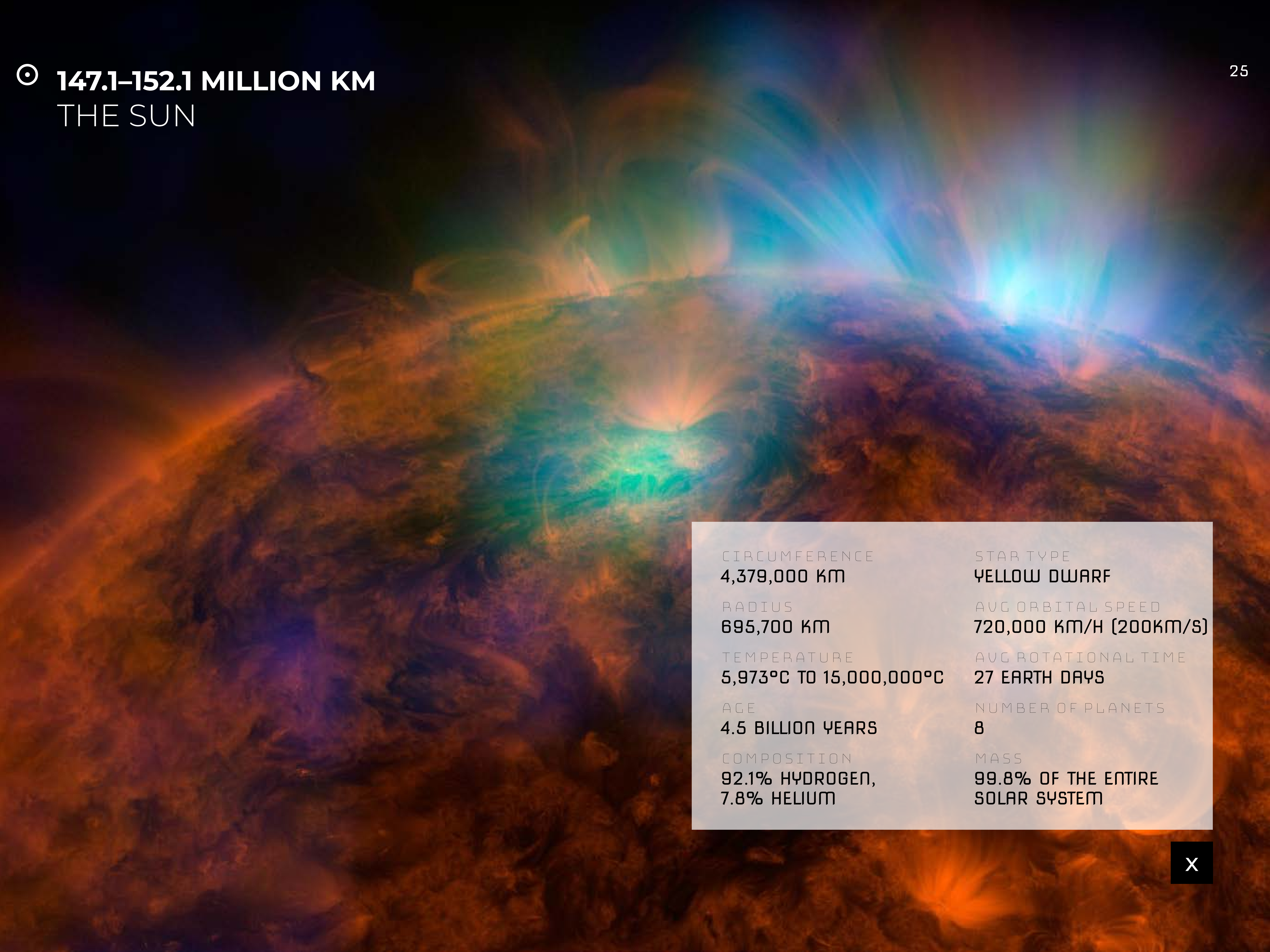
Because Mercury is so close to the Sun, it is hard to directly observe from Earth. However, 13 times each century, observers on Earth can watch Mercury pass across the face of the Sun, an event called a transit. These rare transits fall within several days of 8 May and 10 November.

1631	DISCOVERY
1965	ROTATION REVEALED
1974–5	MARINER 10 FLYBYS
1991	ICY CRATERS FOUND
2008–15	MESSENGER FLYBYS
2018	BEPICOLOMBO LAUNCH

BEPICOLOMBO LAUNCH

BepiColombo launched with a target date for Mercury orbit insertion of 2025.

⊙ 147.1–152.1 MILLION KM
THE SUN



CIRCUMFERENCE
4,379,000 KM

RADIUS
695,700 KM

TEMPERATURE
5,973°C TO 15,000,000°C

AGE
4.5 BILLION YEARS

COMPOSITION
92.1% HYDROGEN,
7.8% HELIUM

STAR TYPE
YELLOW DWARF

AVG ORBITAL SPEED
720,000 KM/H (200KM/S)

AVG ROTATIONAL TIME
27 EARTH DAYS

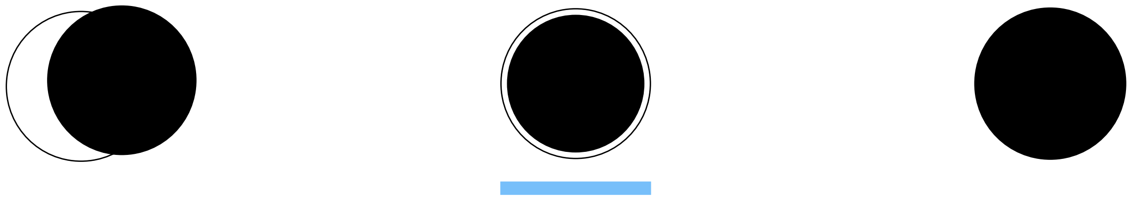
NUMBER OF PLANETS
8

MASS
99.8% OF THE ENTIRE
SOLAR SYSTEM

X

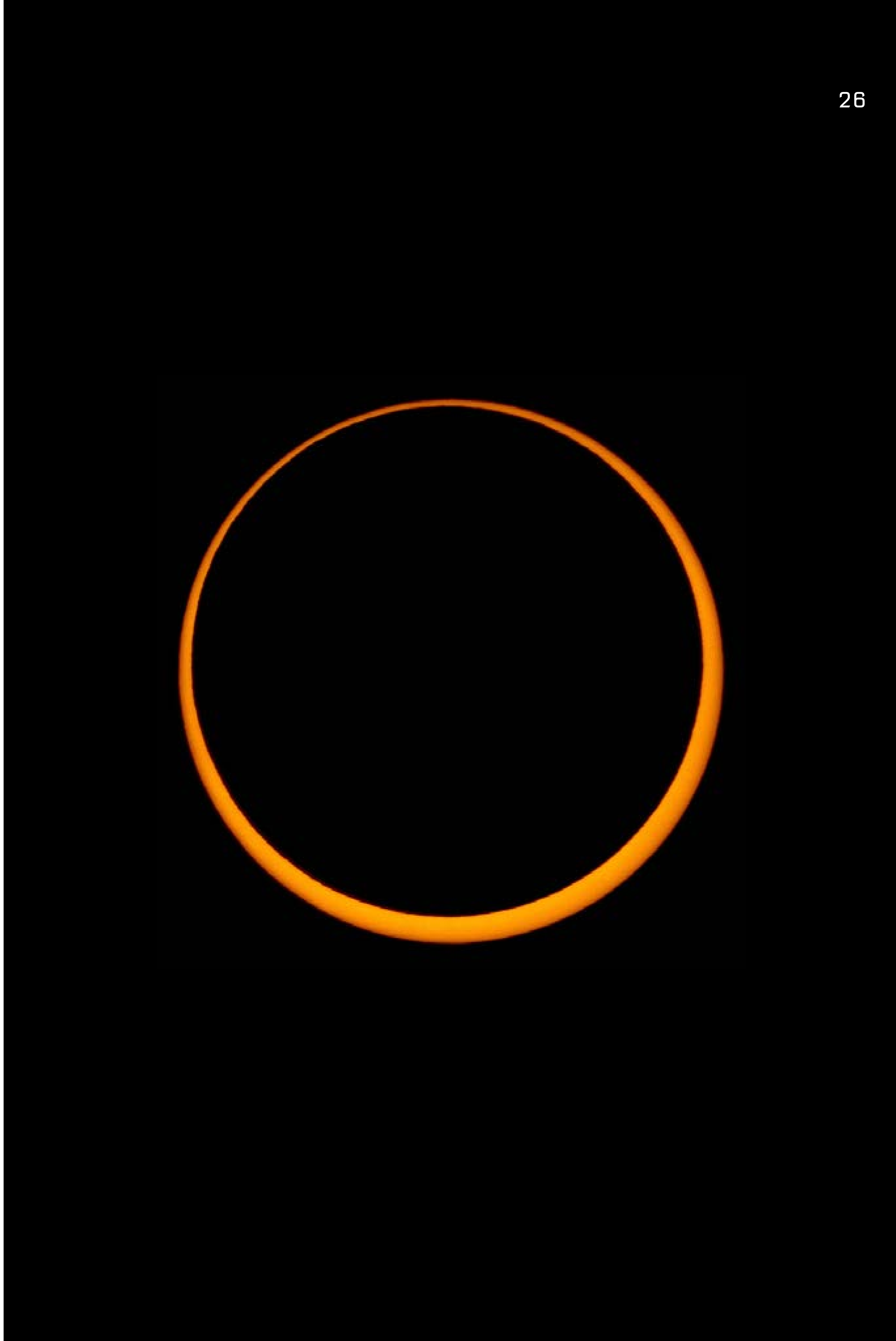
SOLAR ECLIPSES

This image was captured from 100 km north of Tokyo, Japan on 20 May 2012.



ANNULAR ECLIPSE

Occurs when the Sun and Moon are exactly in line with the Earth, but the apparent size of the Moon is smaller than that of the Sun. Hence the Sun appears as a very bright ring, or annulus, surrounding the dark disc of the Moon.



SOLAR ACTIVITY

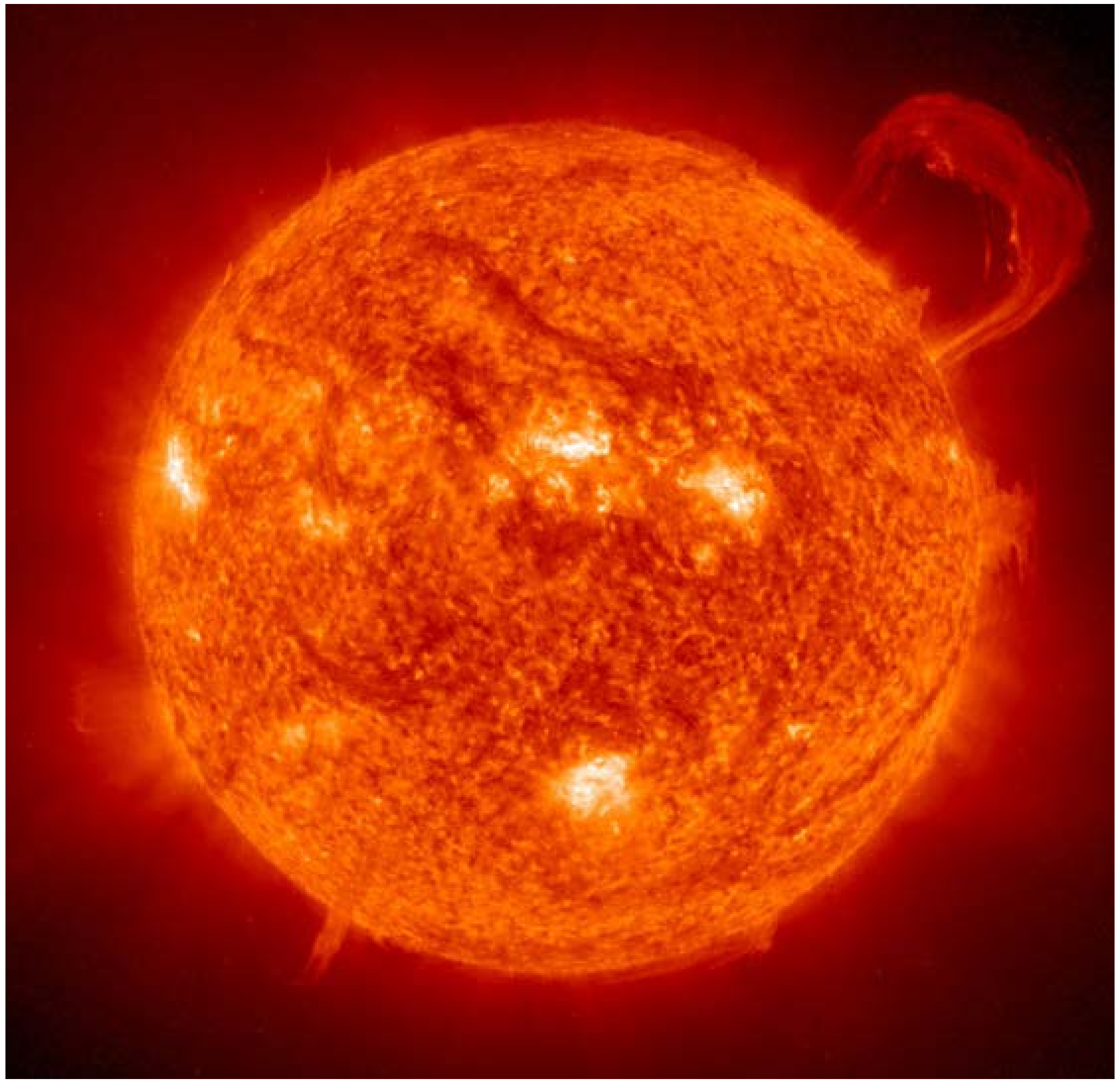
SOLAR FLARE

SOLAR PROMINENCE

CORONAL MASS EJECTION

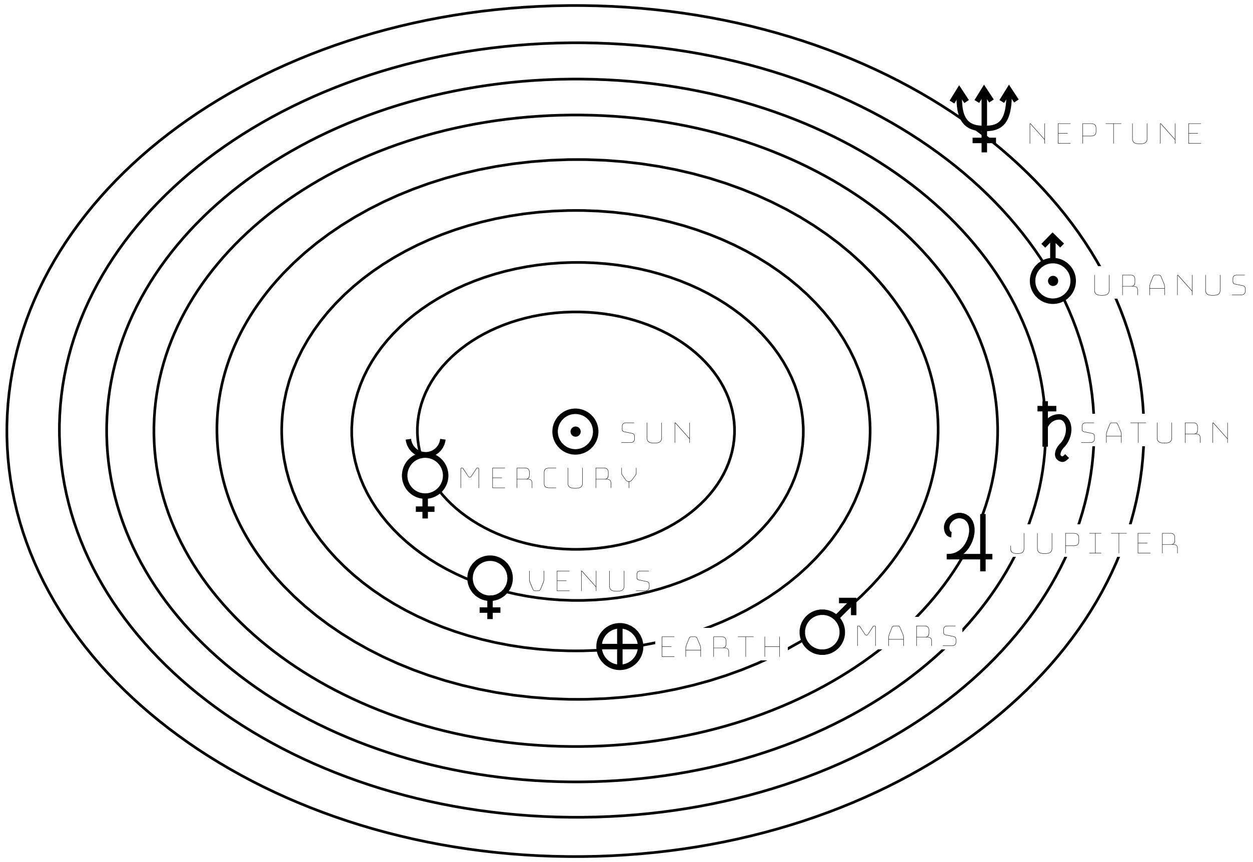
CORONAL HOLES

SUNSPOTS



SOLAR PROMINENCE

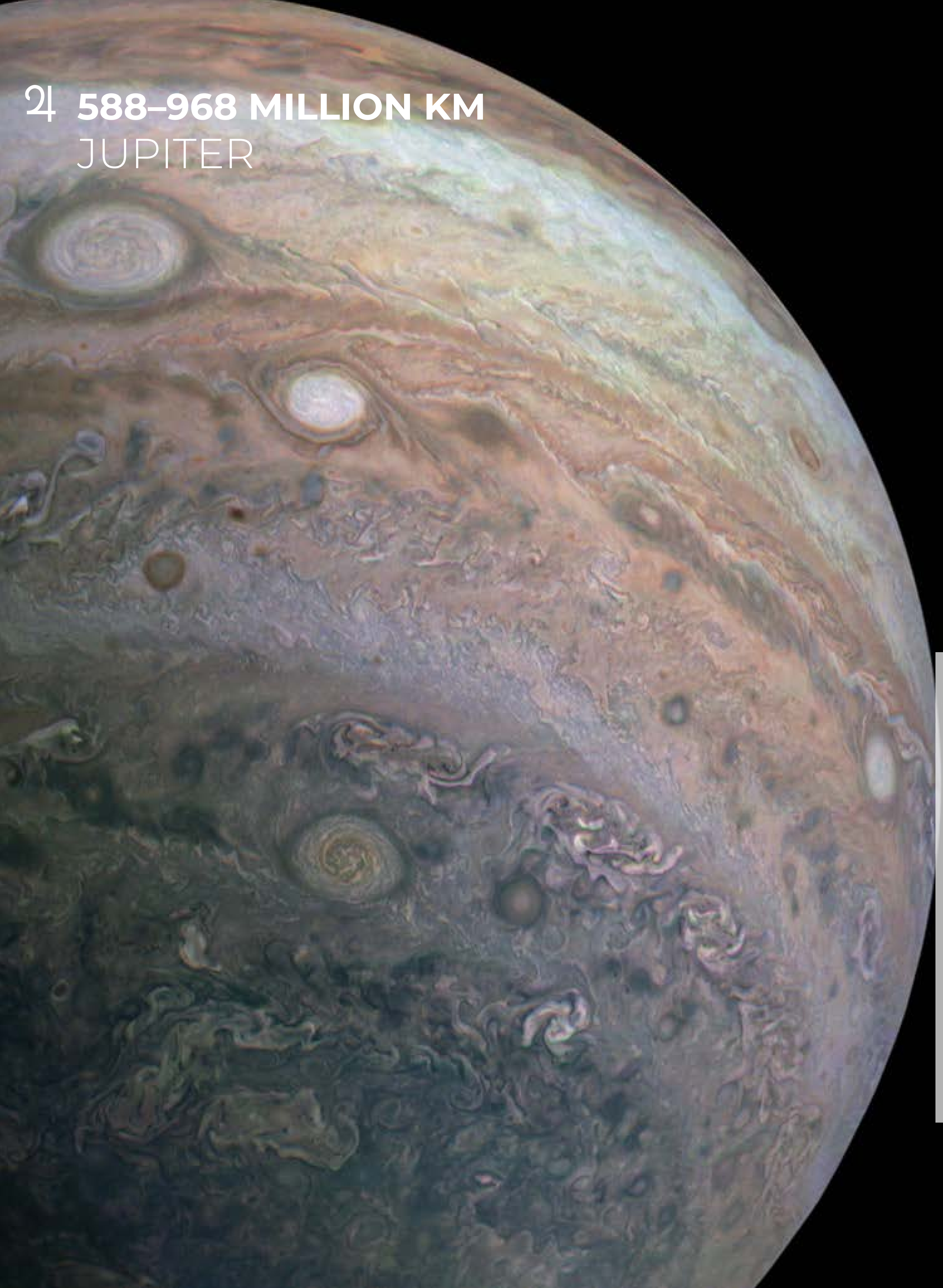
A solar prominence is a large, bright feature extending outward from the Sun's surface. A prominence forms over timescales of about a day, and stable prominences may persist in the corona for several months. The red-glowing looped material is plasma, a hot gas comprised of electrically charged hydrogen and helium. The prominence plasma flows along a twisted structure of magnetic fields generated by the Sun’s internal dynamo. An erupting prominence occurs when such a structure becomes unstable and bursts outward, releasing the plasma.



WATCH A 10-YEAR TIME LAPSE OF THE SUN

EXPLORE THE SOLAR SYSTEM

♃ 588–968 MILLION KM
JUPITER



MOONS	53 CONFIRMED | 26 PROVISIONAL
RINGS	0
MISSIONS	NINE SPACECRAFT: 7 FLEW BY AND 2 HAVE ORBITED
ATMOSPHERE	MOSTLY HYDROGEN AND HELIUM
SURFACE TEMPERATURE	-108°C
DAY	9.93 HOURS
YEAR	4,332.82 DAYS (11.86 YEARS)
DIAMETER	142,984 KM – 11 EARTHS COULD FIT ACROSS JUPITER'S EQUATOR
RADIUS	69,911 KM
PLANET TYPE	GAS GIANT

♃ THE LARGEST PLANET

Jupiter is by far the largest planet in the solar system – more than twice as massive as all the other planets combined. It is nearly 11 times the size of Earth and 317 times its mass. Jupiter, being the biggest planet, gets its name from the king of the ancient Roman gods.

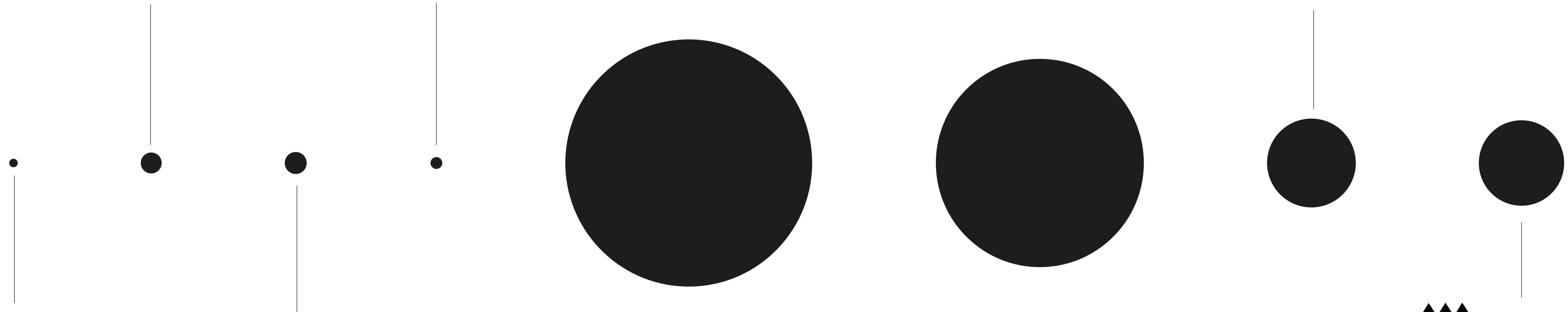
PLANET RELATIVE SIZES

∅ Equatorial diameter
○ Mass
⊕ Mass relative to earth

♀ VENUS
∅ 12,103.6 km
○ 4.87×10^{24} kg
⊕ 0.815

♂ MARS
∅ 6,792.4 km
○ 6.42×10^{23} kg
⊕ 0.107

⛢ URANUS
∅ 51,118 km
○ 8.68×10^{25} kg
⊕ 14.5



☿ MERCURY
∅ 4,879.4 km
○ 3.30×10^{23} kg
⊕ 0.0553

⊕ EARTH
∅ 12,756.3 km
○ 5.97×10^{24} kg
⊕ 1

♃ JUPITER
∅ 142,984 km
○ 1.90×10^{27} kg
⊕ 318

♄ SATURN
∅ 120,536 km
○ 5.68×10^{26} kg
⊕ 95.2

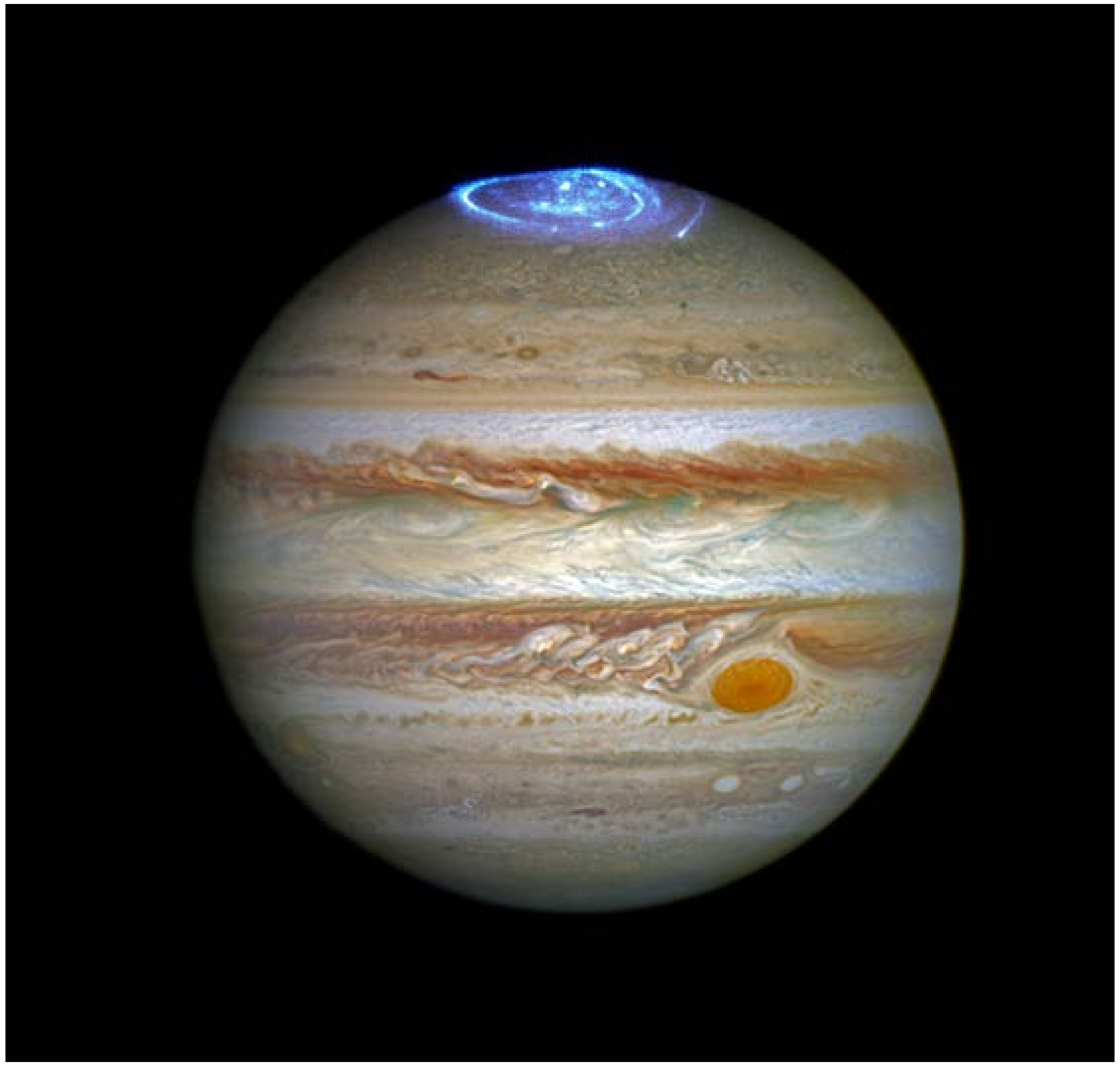
♆ NEPTUNE
∅ 49,528 km
○ 1.02×10^{26} kg
⊕ 17.1

EXPLORING JUPITER

Nine spacecraft have studied Jupiter up close. NASA's Juno spacecraft is currently studying the gas giant planet from orbit. The spacecraft, which arrived at Jupiter in July 2016, is the first to study the planet's mysterious, cloud-shrouded interior. Two new missions are in the works to make close studies of Jupiter's moons: NASA's Europa Clipper and ESA's JUpiter ICy Moons Explorer (JUICE).

SPACECRAFT STUDIES

Pioneer 10 was the first spacecraft to fly past Jupiter. It was followed by Pioneer 11, Voyager 1 and Voyager 2 flybys. NASA's Galileo mission was first to orbit Jupiter and to send an atmospheric probe into the stormy clouds. The international Ulysses mission used Jupiter's powerful gravity to hurl itself into orbital passes of the Sun's northern and southern poles. Both Cassini and New Horizons studied Jupiter as they hurtled on to their main science targets — Saturn for Cassini and Pluto and the Kuiper Belt for New Horizons.



♄ 1.2–1.7 BILLION KM
SATURN

MOONS
53 CONFIRMED | 29 PROVISIONAL

RINGS
7 GROUPS

MISSIONS
PIONEER 11 AND VOYAGERS 1 AND 2 FLEW BY; CASSINI ORBITED SATURN

ATMOSPHERE
MOSTLY HYDROGEN AND HELIUM

SURFACE TEMPERATURE
−139°C

DAY
10.7 HOURS

YEAR
10,755.70 DAYS (29.45 YEARS)

DIAMETER
120,536 KM – 9 TIMES WIDER THAN EARTH

RADIUS
58,232 KM

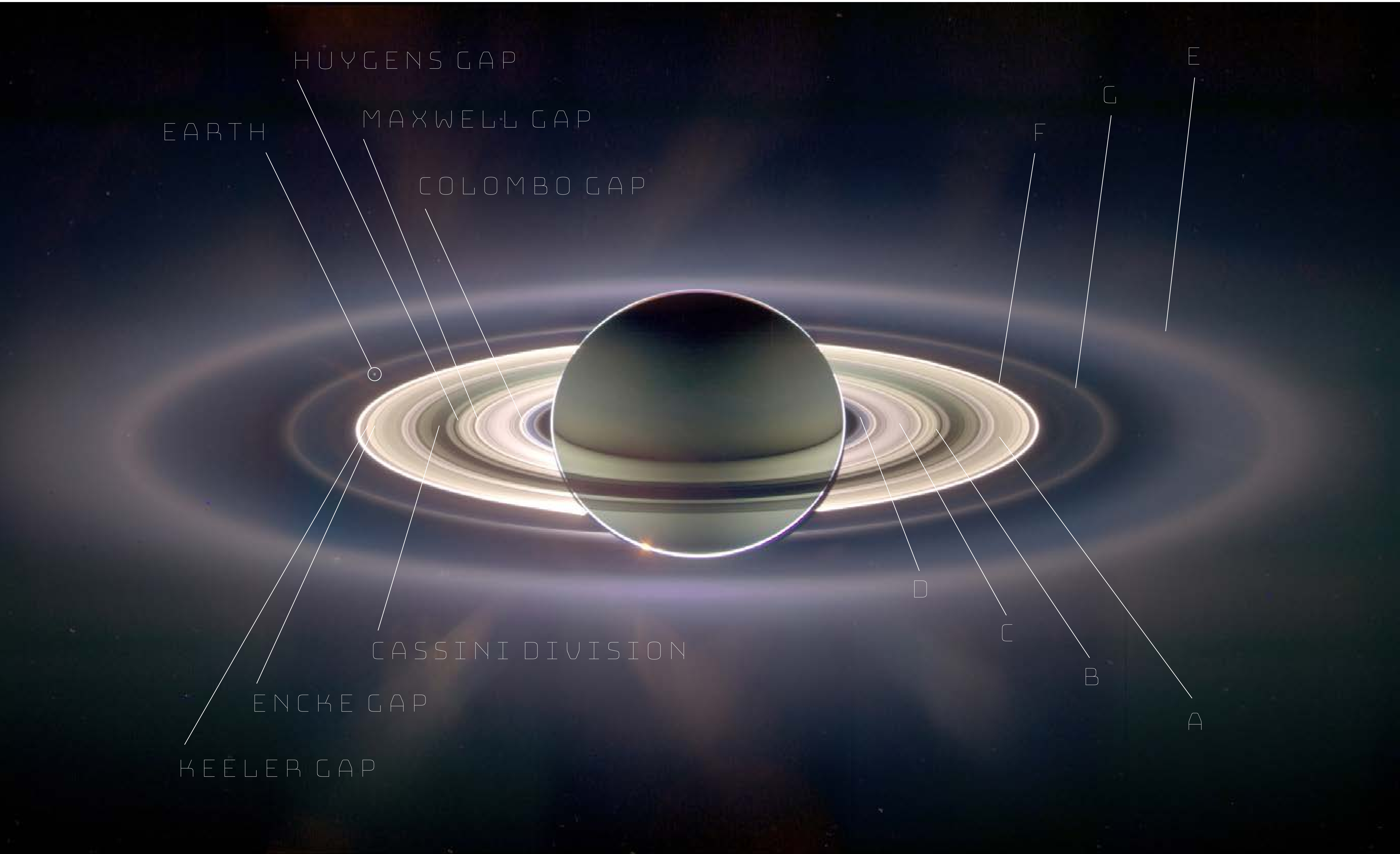
PLANET TYPE
GAS GIANT

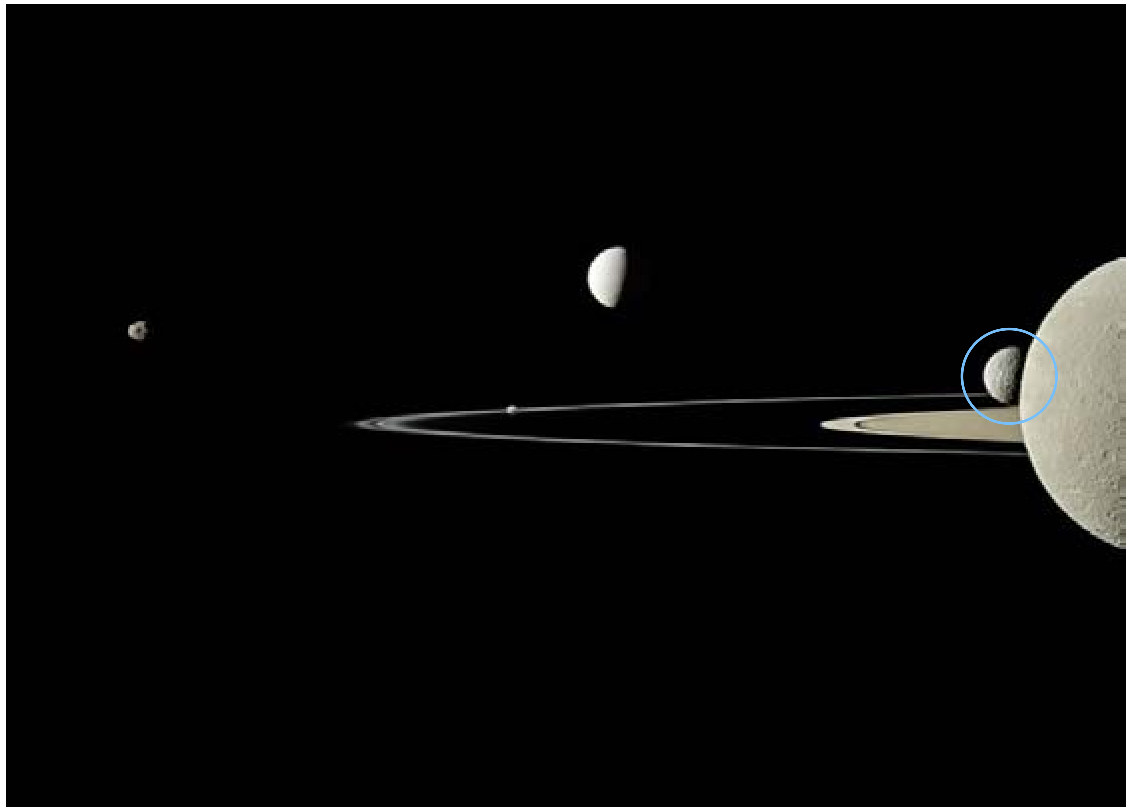
X

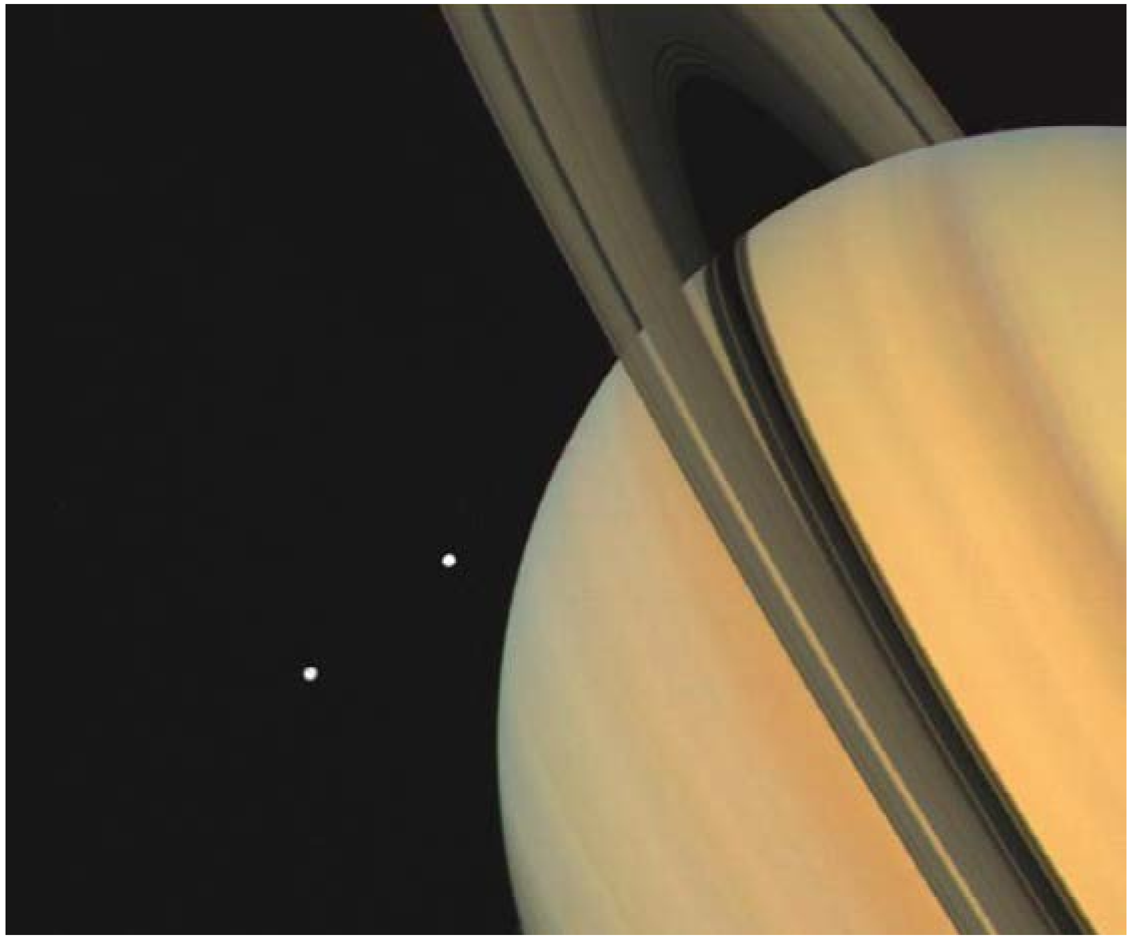
♄ SATURN'S RINGS

Saturn has seven rings and several gaps and divisions between them.

Looking closely, earth is visible in this image as a small speck just below the G ring.

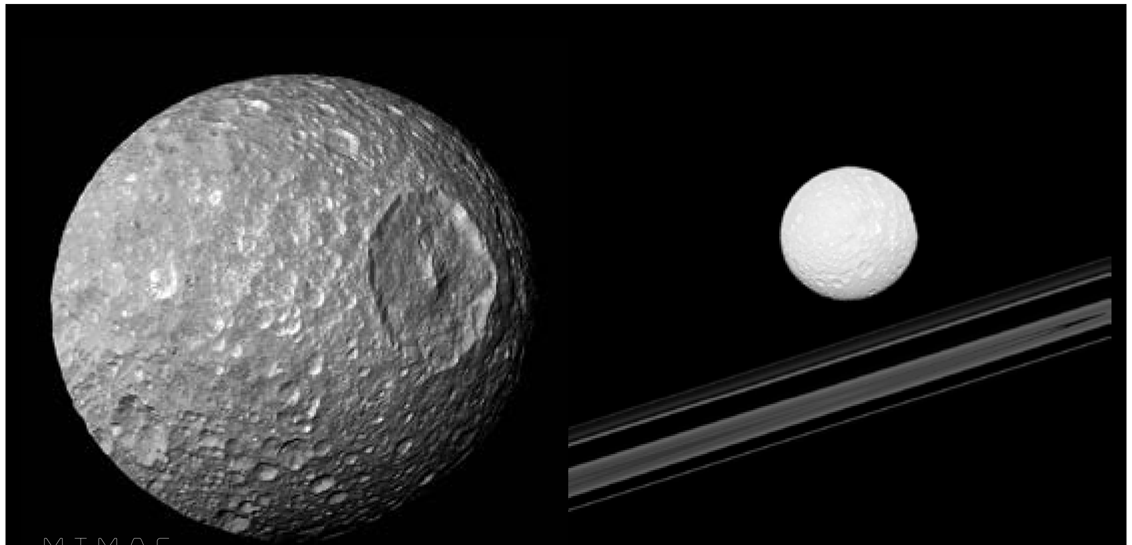






EXPLORE SOME OF SATURN'S MOONS

- JANUS
- PANDORA
- ENCELADUS
- RHEA
- MIMAS
- DIONE
- TETHYS



MIMAS

Mimas was discovered in 1789 by English astronomer William Herschel, using his 40-foot reflector telescope. Less than 198 km in mean radius, crater-covered Mimas is the smallest and innermost of Saturn's major moons. It is somewhat ovoid, with dimensions of 207 x 197 x 191 km. Its low density suggests that it consists almost entirely of water ice, which is the only substance ever detected on Mimas. At a mean distance just over 186,000 km from the massive planet, Mimas takes only 22 hours and 36 minutes to complete an orbit. Most of the Mimas surface is saturated with impact craters ranging in size up to greater than 40 km in diameter.

2.57–3.15 BILLION KM

URANUS

MOONS
27

RINGS
0

MISSIONS
VOYAGER 2

ATMOSPHERE
MOSTLY HYDROGEN AND HELIUM, A SMALL AMOUNT OF METHANE AND TRACES OF WATER AND AMMONIA

SURFACE TEMPERATURE
–197°C

DAY
17 H, 14 M

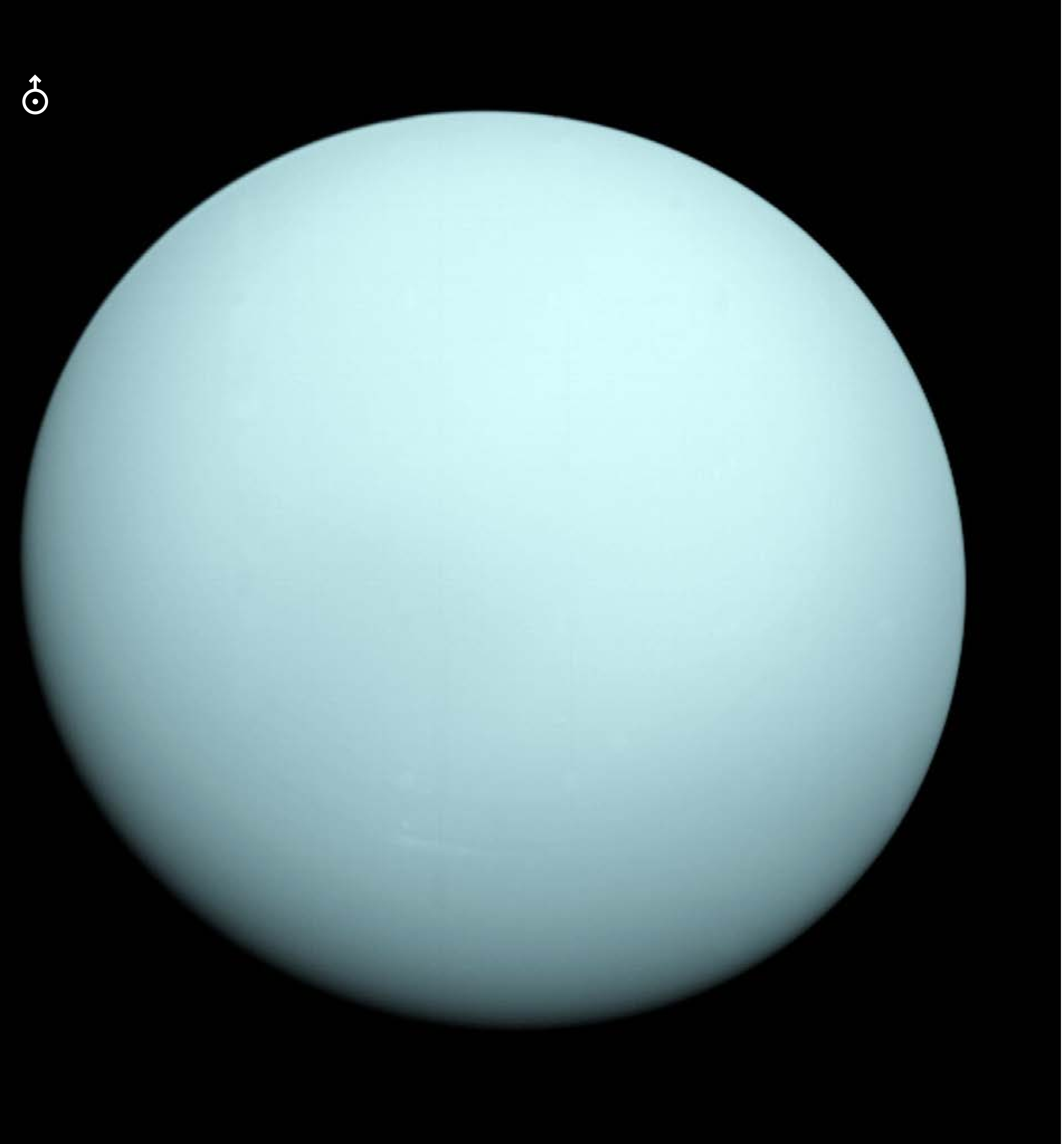
YEAR
30,687.15 DAYS (84.02 YEARS)

DIAMETER
51,118 KM – 4 TIMES WIDER THAN EARTH

RADIUS
25,362 KM

PLANET TYPE
ICE GIANT

X



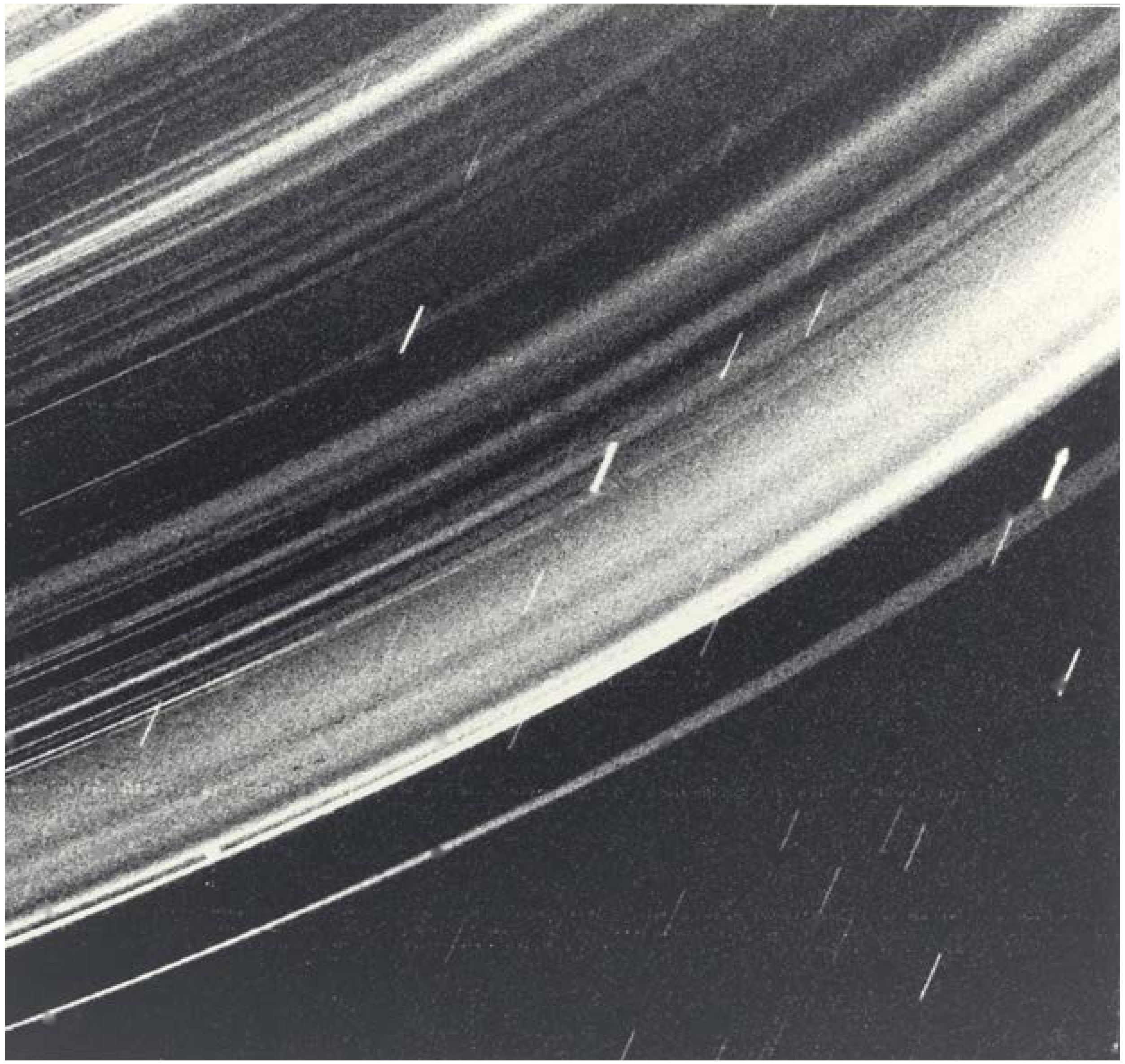
EXPLORING URANUS

Only one spacecraft has visited distant Uranus. After traveling more than 3 billion kilometers in nine years, NASA's Voyager 2 gathered much of its critical information about the planet, including its rings and moons, in just six hours.

1781	DISCOVERY
1787–1851	4 MOONS DISCOVERED
1948	5TH MOON DISCOVERED
1977	RINGS DISCOVERED
1986	VOYAGER 2 FLYBY
2005	HUBBLE DISCOVERIES
2011	NEW HORIZONS FLYBY

NEW HORIZONS FLYBY

On 18 March 2011, New Horizons passed the orbit of Uranus – the first spacecraft to journey beyond Uranus' orbit since Voyager 2. However, Uranus was not near the crossing point. The spacecraft is asleep during most of its eight-year trek from Jupiter to Pluto.



VOYAGER 2 IMAGES

RINGS

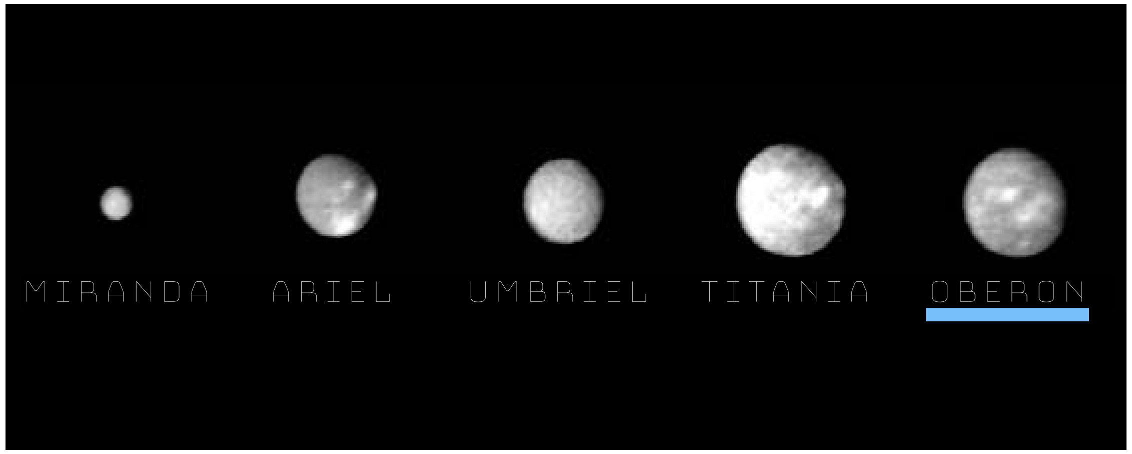
This image reveals a continuous distribution of small particles throughout the Uranus ring system. This unique geometry and a long, 96-second exposure reveal fine dust particles not visible from other viewing angles. All the previously known rings are visible. However, some of the brightest features in the image are bright dust lanes not previously seen. The streaks are trailed stars.

MOONS

This portrait of Uranus' five largest moons was compiled from images sent back by Voyager 2 on 20 January 1986. The pictures were taken through a clear filter from distances of 5–6.1 million km. In this comparison, we see the relative sizes and relativities of the satellites in order of increasing distance from the planet. All five satellites show only slight colour variations on their surfaces, with their average colour being very nearly grey.

OBERON

Oberon and Titania are the largest moons. Like Titania, Oberon is about half the size of Earth's moon, and reflects about 20 percent of the sunlight.



4.298–4.702 BILLION KM
NEPTUNE

MOONS
14

RINGS
AT LEAST 5

MISSIONS
VOYAGER 2

ATMOSPHERE
MOSTLY HYDROGEN AND HELIUM WITH A LITTLE BIT OF METHANE

SURFACE TEMPERATURE
-201°C

DAY
16 HOURS

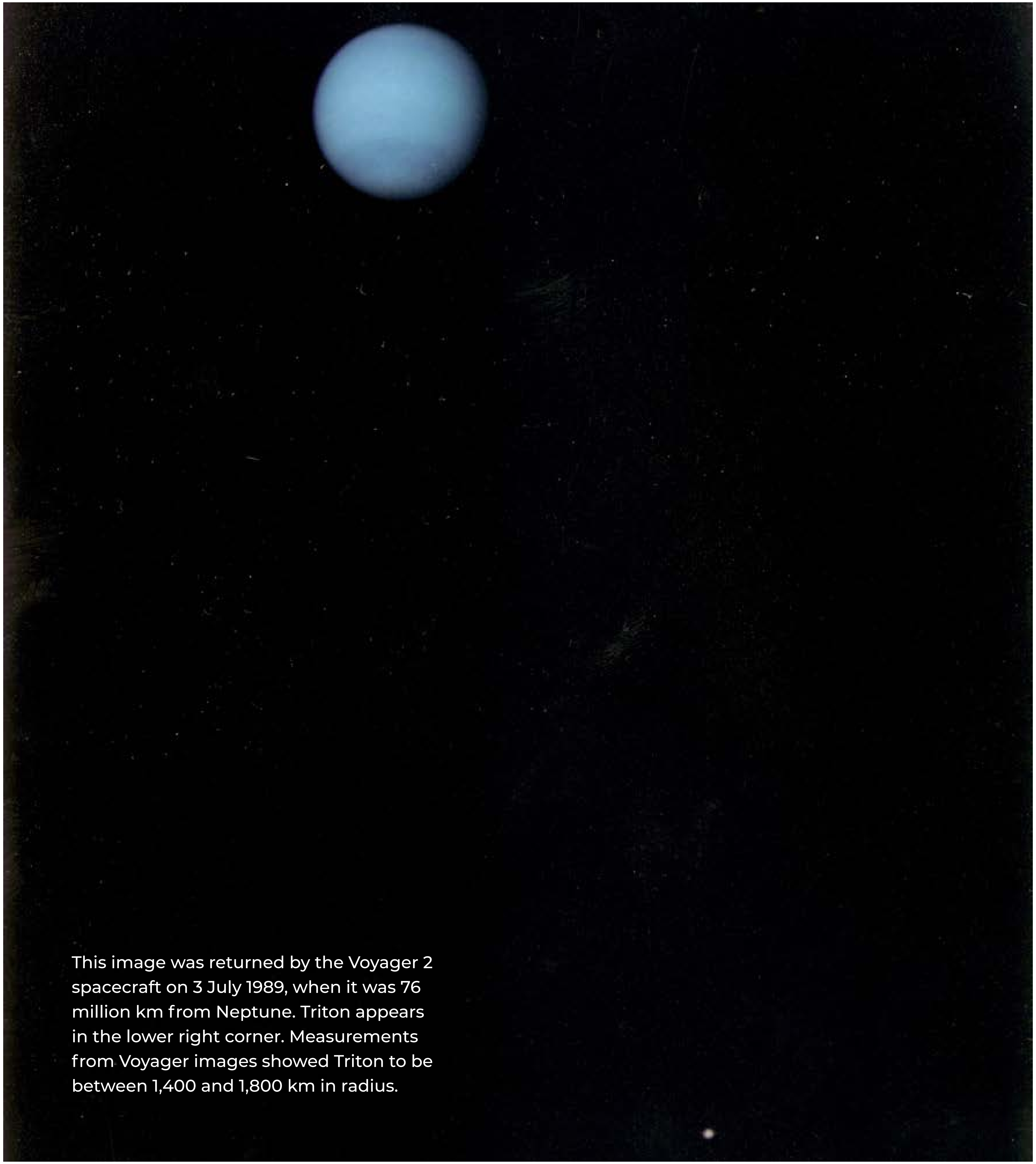
YEAR
60,190.03 DAYS (164.79 YEARS)

DIAMETER
49,528 KM - ABOUT 4 TIMES WIDER THAN EARTH

RADIUS
24,622 KM

PLANET TYPE
ICE GIANT

X



This image was returned by the Voyager 2 spacecraft on 3 July 1989, when it was 76 million km from Neptune. Triton appears in the lower right corner. Measurements from Voyager images showed Triton to be between 1,400 and 1,800 km in radius.

EXPLORING NEPTUNE

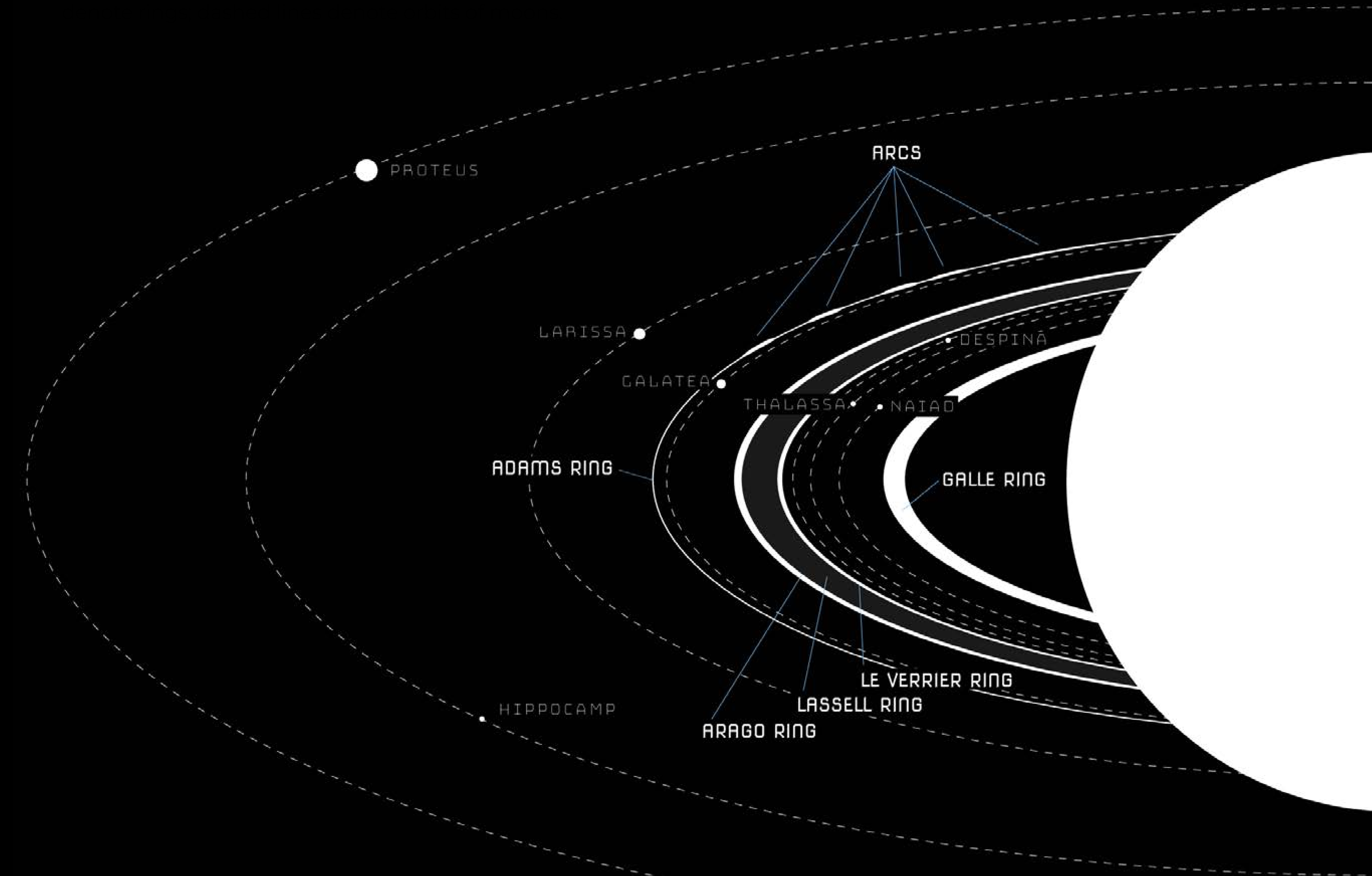
In 1846, Neptune became the first planet located through mathematical predictions rather than through observations of the sky. More than 140 years later, in 1989, Voyager 2 became the first and only spacecraft to study Neptune up close.

1612	RECORDED AS STAR
1846	DESIGNATED A PLANET
1983	PIONEER 10 PASSES
1984	RINGS DISCOVERED
1989	VOYAGER 2 FLYBY
2002	MOONS DISCOVERED
2005	RING DETERIORATION
2013	NEW MOON DISCOVERED
2016	HUBBLE DISCOVERIES

NEW MOON DISCOVERED

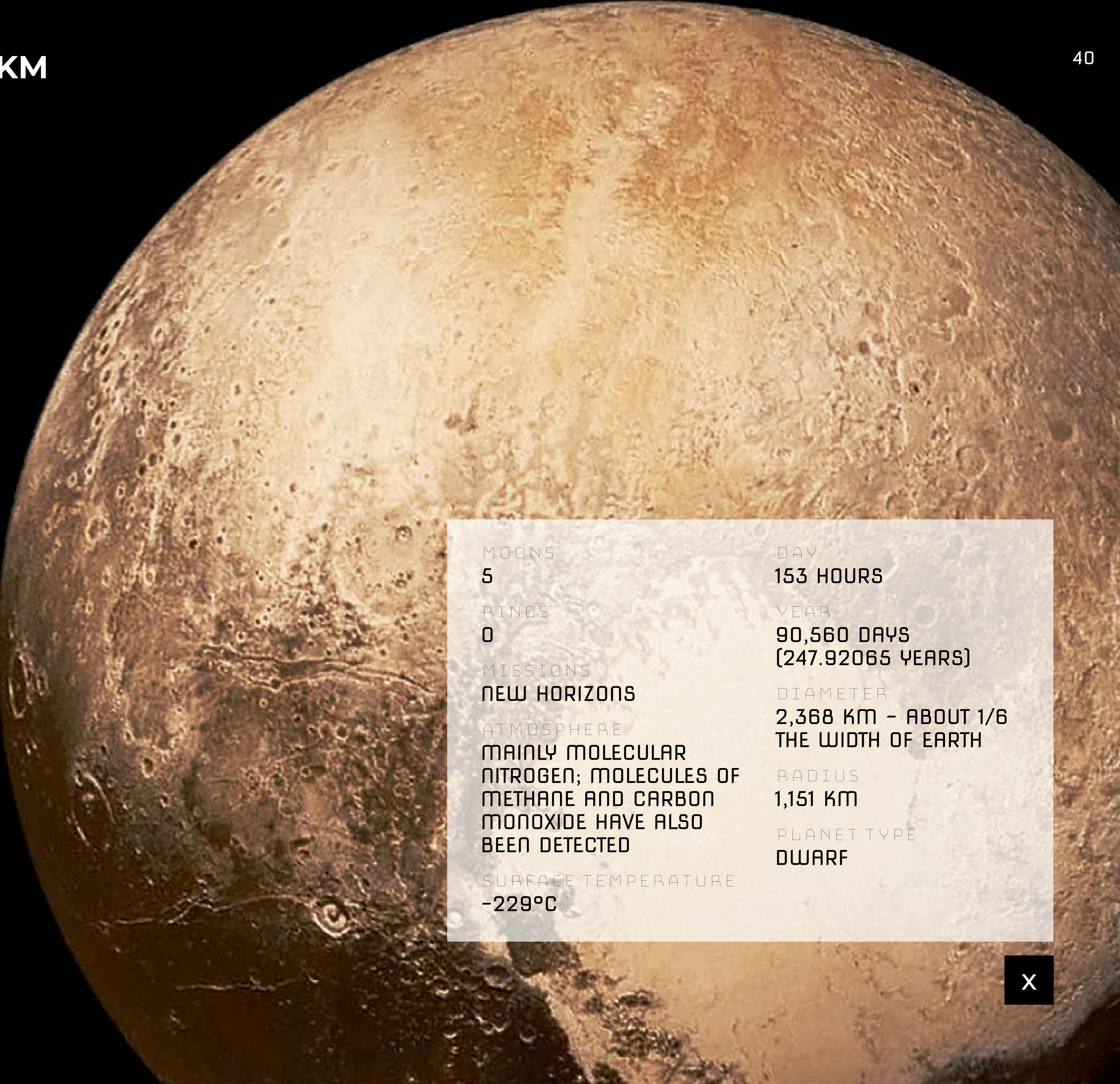
A scientist studying Neptune's ring arcs in archival Hubble Telescope images found a previously unknown 14th moon of Neptune, provisionally designated S/2004 N 1.

RINGS OF NEPTUNE



4.28–7.5 BILLION KM

PLUTO



MOONS
5

RINGS
0

MISSIONS
NEW HORIZONS

ATMOSPHERE
MAINLY MOLECULAR NITROGEN; MOLECULES OF METHANE AND CARBON MONOXIDE HAVE ALSO BEEN DETECTED

SURFACE TEMPERATURE
-229°C

DAY
153 HOURS

YEAR
90,560 DAYS (247.92065 YEARS)

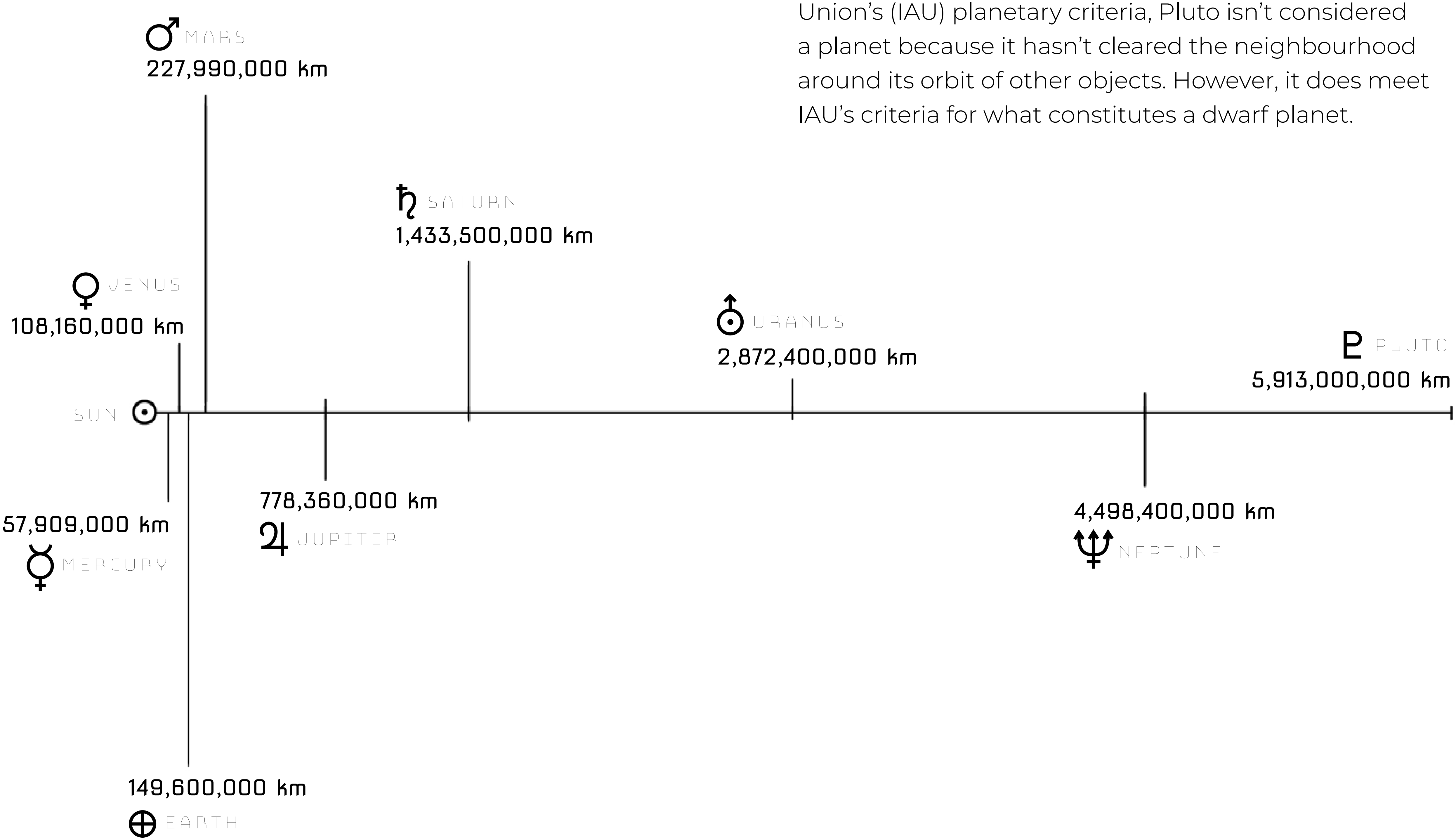
DIAMETER
2,368 KM – ABOUT 1/6 THE WIDTH OF EARTH

RADIUS
1,151 KM

PLANET TYPE
DWARF

PLANET RELATIVE DISTANCES

—— 1 AU (149.6 million km)



A DWARF PLANET

Pluto's classification as a planet has had a history of changes. Since 2006, per the International Astronomical Union's (IAU) planetary criteria, Pluto isn't considered a planet because it hasn't cleared the neighbourhood around its orbit of other objects. However, it does meet IAU's criteria for what constitutes a dwarf planet.

EXPLORE THE SURFACE

In July 2015, New Horizons spacecraft passed within 15,400 km of Pluto's surface, capturing photos using its Long Range Reconnaissance Imager (LORRI).

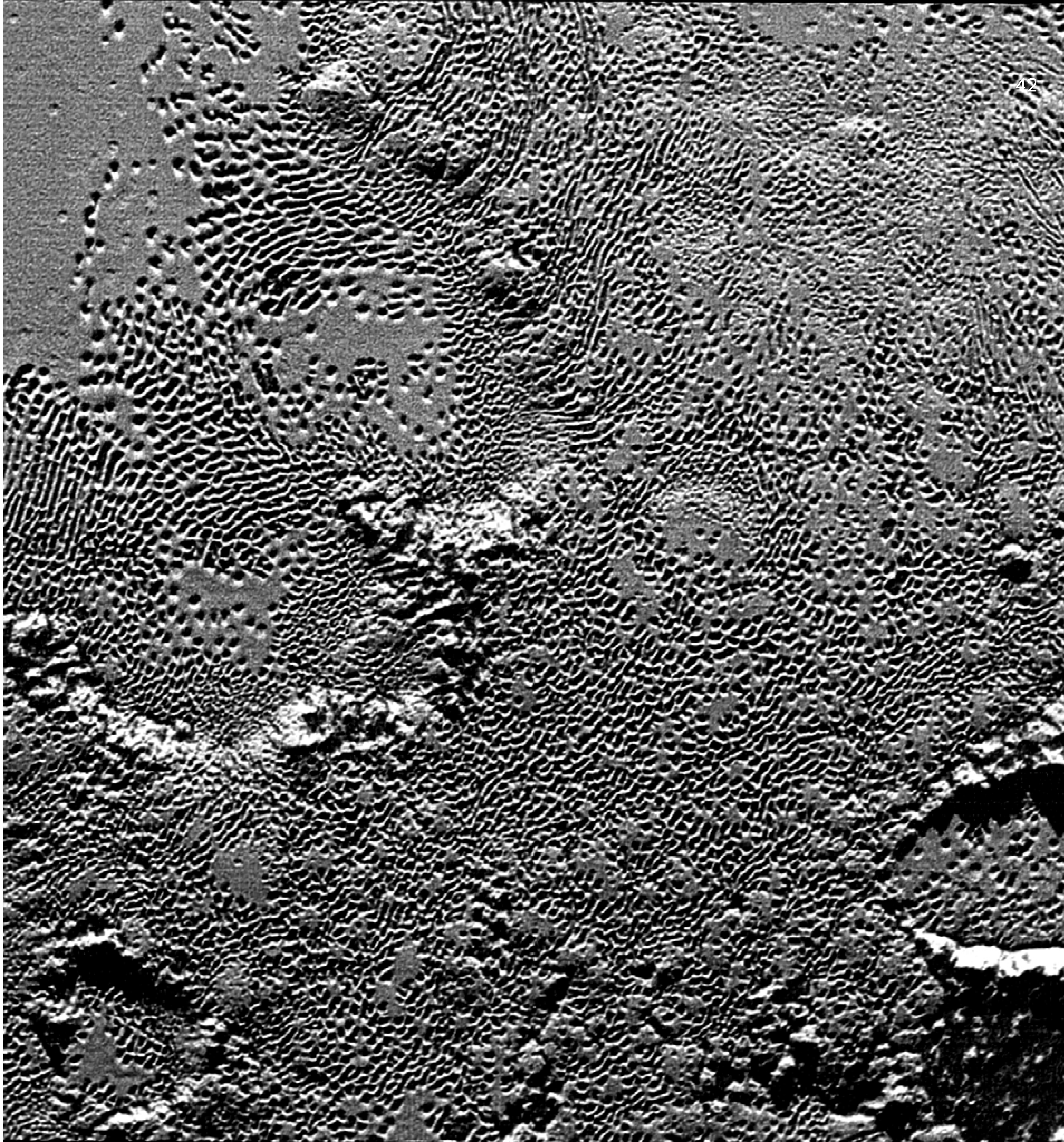
PATTERN OF PITS

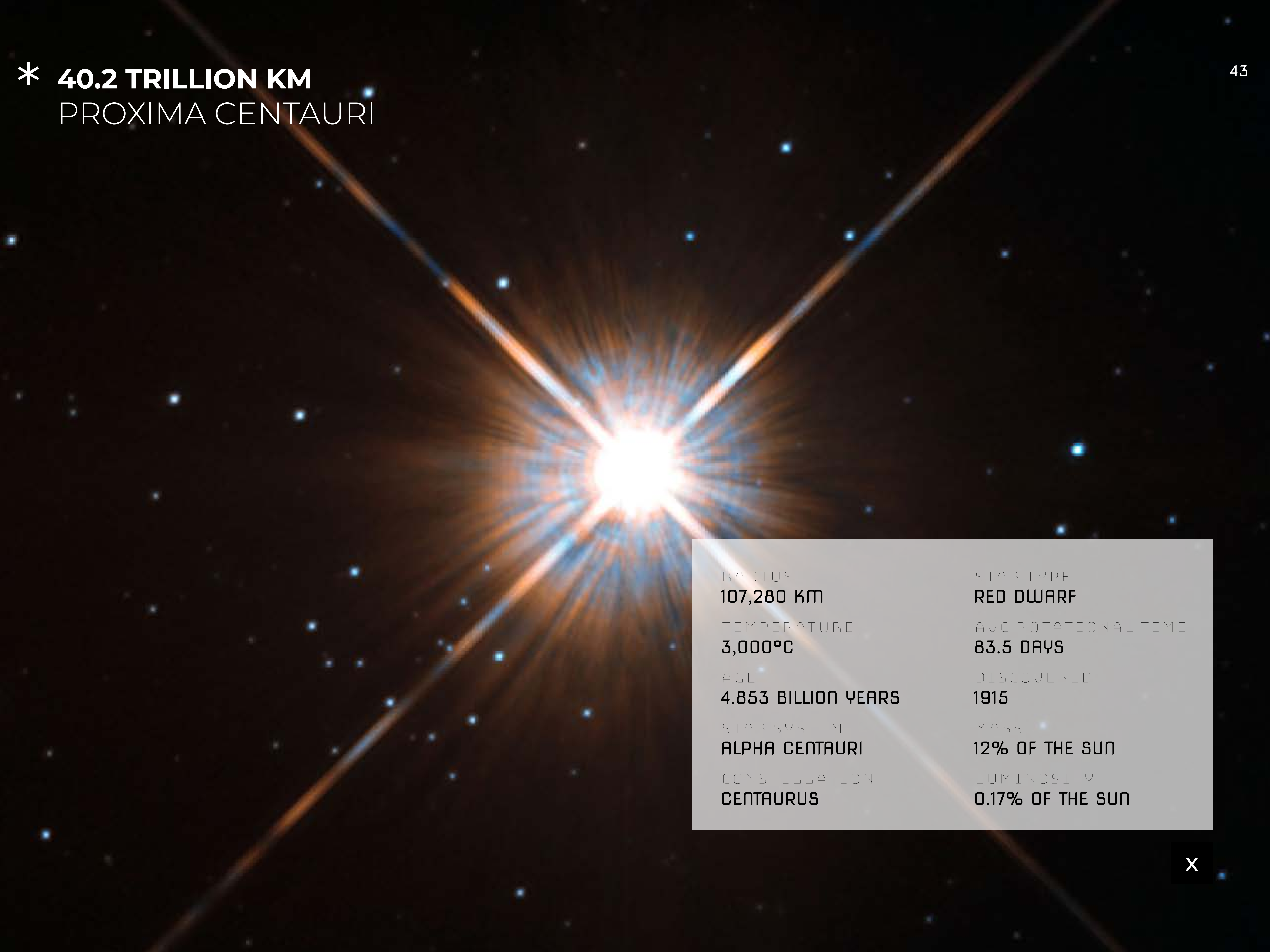
ICE PLAINS

PLUTO'S HORIZON

PATTERN OF PITS

This image depicts the intricate pattern of 'pits' across a section of Pluto's prominent heart-shaped region, Tombaugh Regio. These indentations may form through a combination of ice fracturing and evaporation. The scarcity of overlying impact craters in this area indicates that these pits – typically hundreds of yards across and tens of yards deep – formed relatively recently. Their alignment provides clues about the ice flow and the exchange of nitrogen and other volatile materials between the surface and the atmosphere.

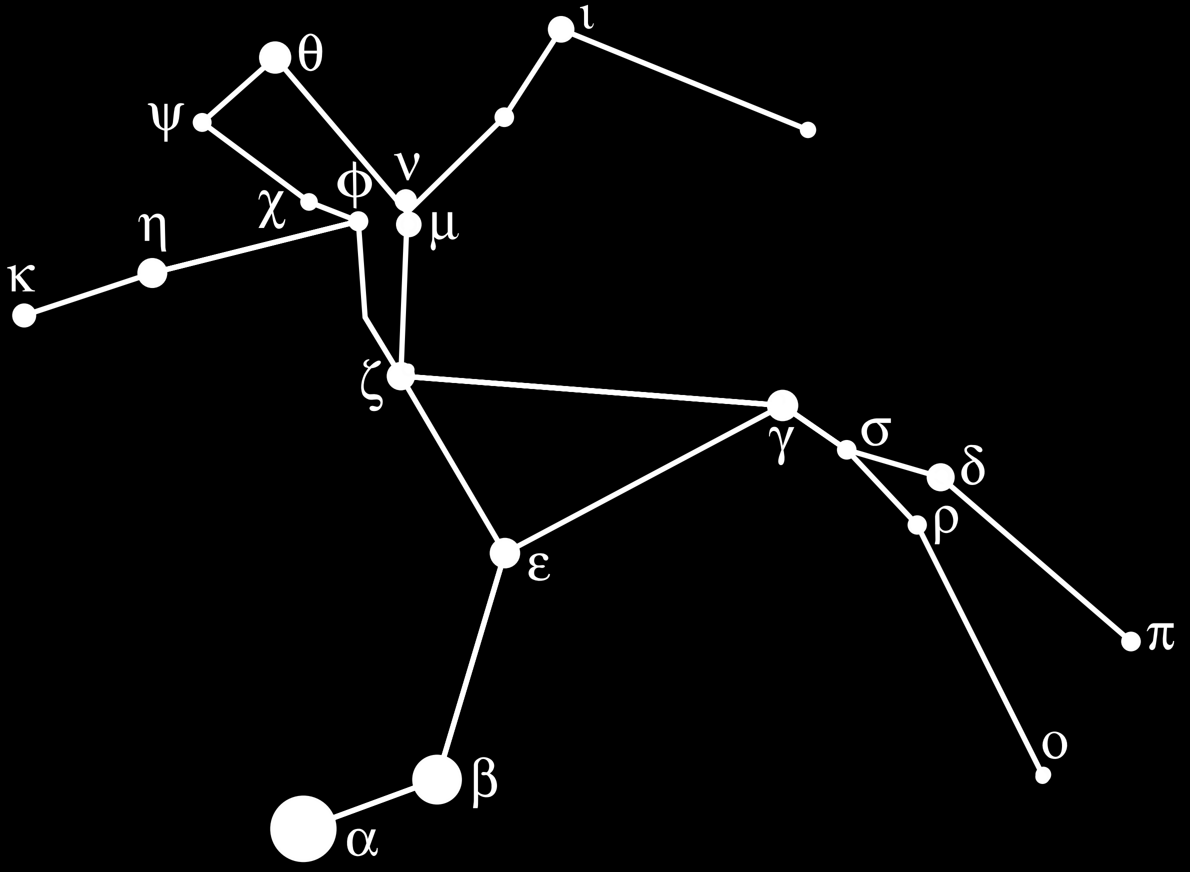




* 40.2 TRILLION KM
PROXIMA CENTAURI

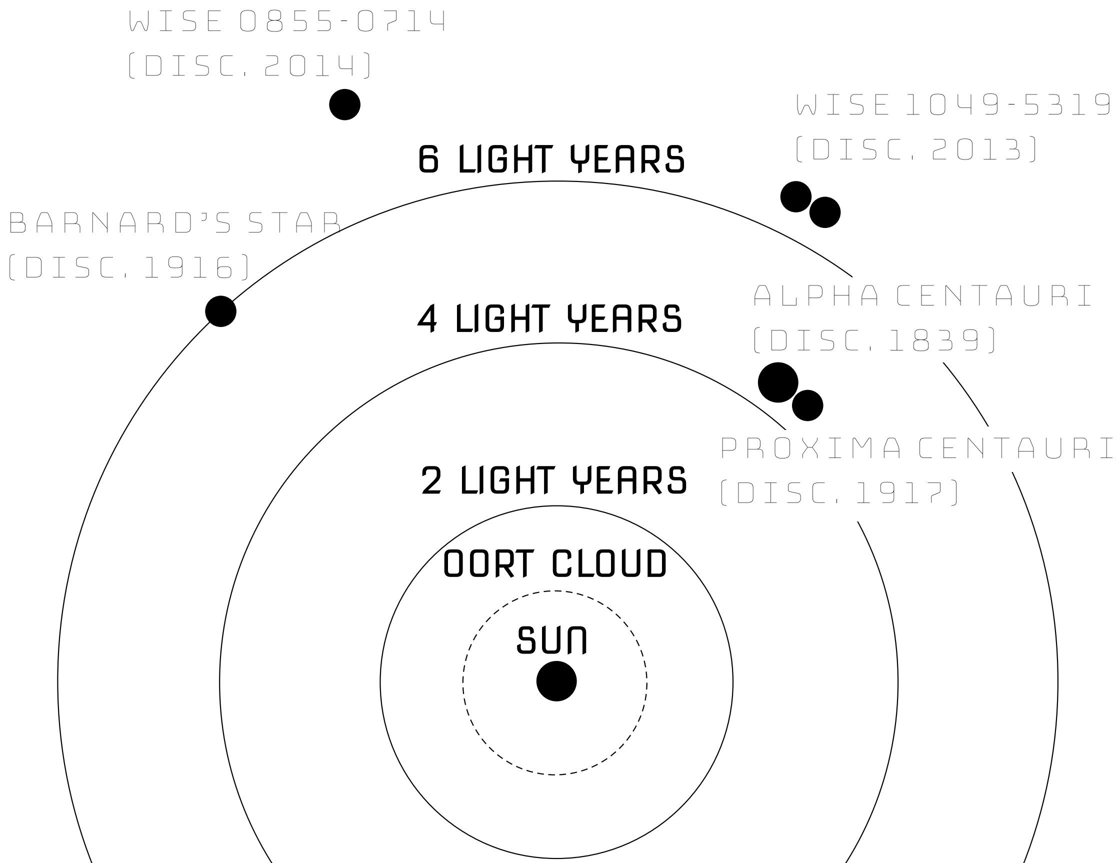
RADIUS	107,280 KM
TEMPERATURE	3,000°C
AGE	4.853 BILLION YEARS
STAR SYSTEM	ALPHA CENTAURI
CONSTELLATION	CENTAURUS
STAR TYPE	RED DWARF
AVG ROTATIONAL TIME	83.5 DAYS
DISCOVERED	1915
MASS	12% OF THE SUN
LUMINOSITY	0.17% OF THE SUN

X



THE CLOSEST STAR

Proxima Centauri is our closest stellar neighbour, located in the constellation of Centaurus (The Centaur), 4.3 light-years from Earth. Although it looks bright through the eye of Hubble, Proxima Centauri is not visible to the naked eye. Its average luminosity is very low, and it is quite small compared to other stars, at only about an eighth of the mass of the sun. However, on occasion, its brightness increases. Proxima is what is known as a flare star, meaning that convection processes within the star’s body make it prone to random and dramatic changes in brightness. Astronomers predict that this star will remain middle-aged – or a "main sequence" star – for another four trillion years, some 300 times the age of the current universe.

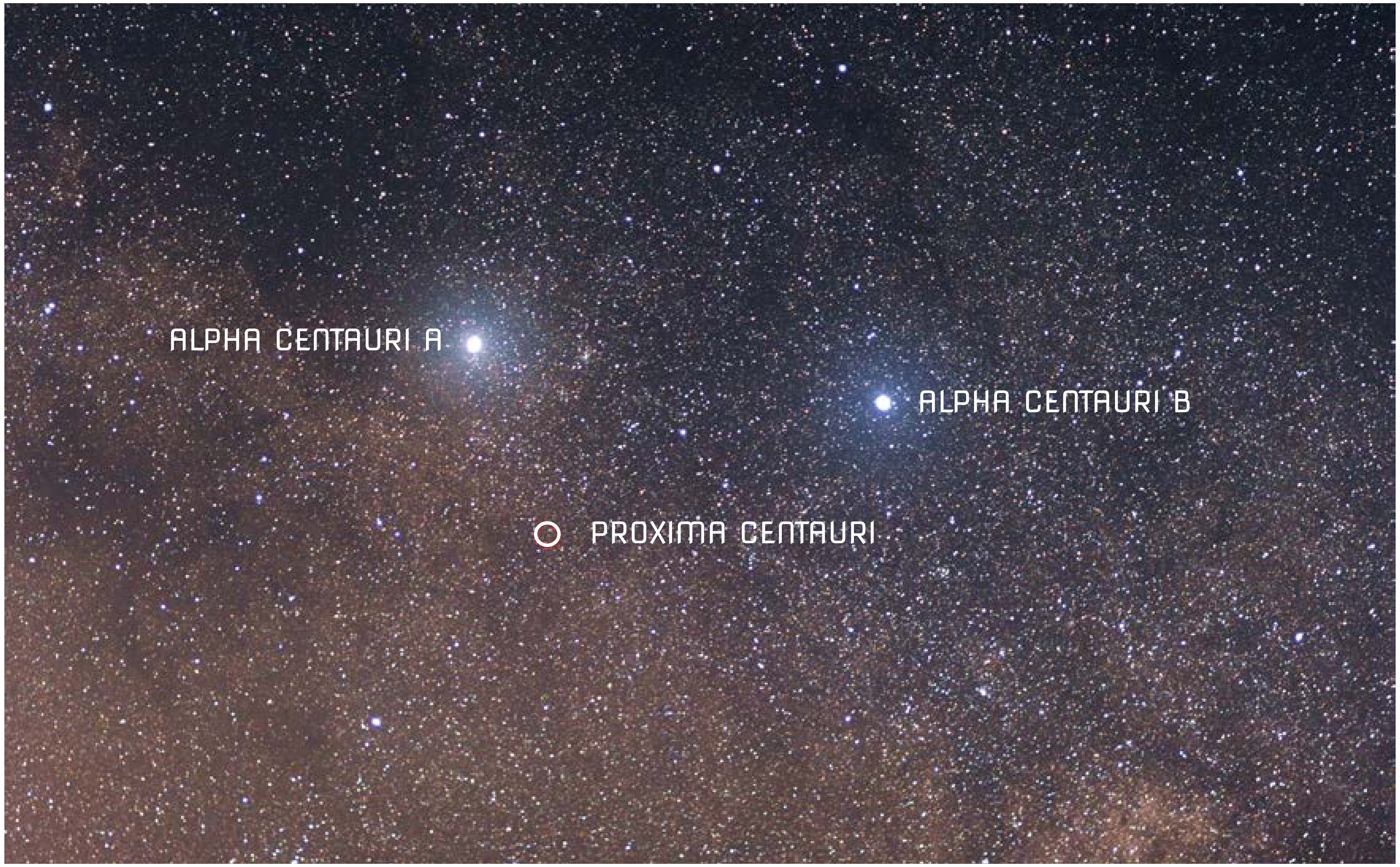


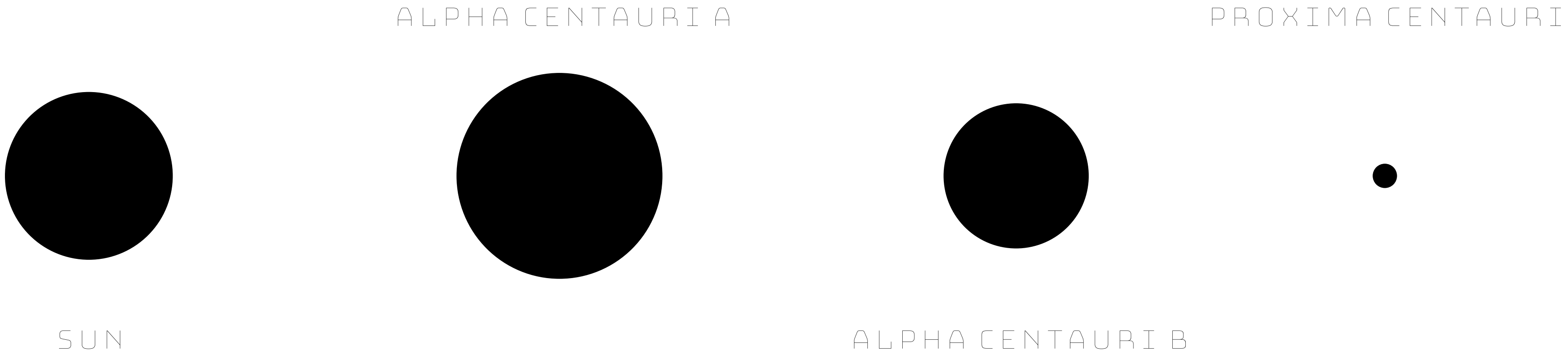
ALPHA CENTAURI

Proxima Centauri is part of a triple star system. This system is made up of the binary formed by the stars Alpha Centauri A and Alpha Centauri B, plus the faint red dwarf Alpha Centauri C, also known as Proxima Centauri.

Compared to the sun, Alpha Centauri A is of the same stellar type, G2, and slightly bigger, while Alpha Centauri B, a K1-type star, is slightly smaller. They orbit a common centre of gravity once every 80 years, with a minimum distance of about 11 times the distance between Earth and the Sun.

On 24 August 2016, astronomers announced the discovery of a nearly Earth-sized planet in the habitable zone orbiting the star Proxima Centauri.





RELATIVE SIZES OF ALPHA CENTAURI SYSTEM STARS AND THE SUN

IMAGES

Earth | NASA

Starry sky | Stephen Rahn via Flickr

International Space Station | NASA/Roscosmos/Mark Vande Hei

Hubble | NASA

The Moon | NASA/Goddard Space Flight Center Scientific Visualization Studio/NASA Johnson

Starman Roadster | SpaceX

Venus | NASA/JPL-Caltech

Mars | NASA/JPL-Caltech/MSSS

Mercury | NASA/JPL/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington

Sun | NASA/SDO/ Joseph Matus/Joel Kowsky/JPL-Caltech/GSFC/MSFC/Stephen Rahn via Flickr/NOAA Satellites via Flickr/Carl Drinkwater via Flickr

Jupiter | NASA/JPL-Caltech/SwRI/MSSS/Kevin M. Gill/ESA/J. Nichols (University of Leicester)/Space Science Institute/University of Arizona

Saturn | NASA/JPL-Caltech/Space Science Institute

Uranus | NASA/JPL

Neptune | NASA/JPL

Pluto | NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute

Proxima Centauri | ESA/Hubble/NASA/Skatebiker via Wikimedia

FONTS

Montserrat | Julieta Ulanovsky, Sol Matas, Juan Pablo del Peral, Jacques Le Bailly via Google Fonts

Nova Square | Wojciech Kalinowski via Google Fonts

Bungee Hairline | David Jonathan Ross via Google Fonts

Ultra | Fabien Korn via Dribbble

GRAPHICS

Starman trajectory | Recreated from Phoenix7777 animation via Wikimedia

Earth icon | GitHub via Wikimedia

Planet relative sizes | Recreated from Beinahegut via Wikimedia

Neptune rings | Recreated from Fama Clamosa via Wikimedia

Planet relative distances | Recreated from Beinahegut via Wikimedia

Centaurus constellation | Recreated from IAU and Sky & Telescope magazine (Roger Sinnott & Rick Fienberg) via Wikimedia

Closest stars to sun | Recreated from NASA/Penn State University

Stars relative sizes | Recreated from Qef via Wikimedia

TEXT

Primarily drawn from **NASA** and **Wikipedia**, with edits by Alice Woodward

BEYOND

AN OUTWARD VOYAGE

THROUGH *SPACE